FOUNDRY TRADE JOURNAL

Established 1902

Vol. 93 Thursday, November 20, 1952 No. 1890

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PUBLISHED WEEKLY: Single Copy, 9d. By Post 11d. Annual Subscription, Home 40s., Abroad 45s. (Prepaid).

49 Wellington Street, London, W.C.2. 'Phone : Temple Bar 3951 (Private Branch Exchange) Grams : "Zacatecas, Rand, London"

Developments in Productivity

What is probably the last of the Productivity Reports of interest to the foundry industry has now been issued. It covers the subject of Woodworking Machinery* and is quite different from the earlier ones, because, by and large, it tells of a trade in which the British excel. A feature disclosed at the Press conference was that at the time the Report was written, over a year ago, iron castings in this country were in short supply and the woodworking machine-tool industry had to take deliveries of sub-standard quality. The American industry did not seem to suffer similar troubles and at the time of the team's visit there was no great pressure on manufacturers of castings. The Report says: "One or two firms visited manufactured very heavy machinery and it was agreed that in general the quality of castings was better than that found in the U.K. to-day." However, to-day the team is satisfied that conditions in this country have improved.

The Report shows how in America there is some specialization in the foundries on one type of machine which enables some sort of mass production to be undertaken, whereas the British firms apparently undertake too wide a range of types and a measure of concentration is advocated. Beyond this, it would seem that British-made plant is made more cheaply, in better buildings and is of better finish than its American counterpart. Even the production methods are quite often superior, but this does not mean that the American market offers a field for exports, as servicing through agents would never equal the high level accorded by American makers. To do so would require much greater capital resources than are available to the members of this comparatively small industry.

We have received from Paris some rather sketchy details of the first international conference on foundry productivity, the outstanding feature of which, according to some of the participants, was a four-hour speech by a well-known French official. He was covering a system he has developed for creating the best atmosphere in French industry for "getting down" to productivity. The conditions in Europe would have to be "adapted" to emulate American productivity. British and American conditions were not dissimilar, but the Continental system of works organization is very different and, in general, is less conducive to wholehearted co-operation from top to bottom than is the case in this country. Even here it is not too good. Many cases of improved productivity were cited, that of the British steel foundries probably being the best. It was felt that the conference was well worth while and the British delegates proposed that there should be a further meeting in London. As increased productivity is essential to this country if we are to avoid mass starvation, support must be given to all activities which will help to support continued development.

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* Obtainable from the Anglo-American Council on Productivity, 21, Tothill Street, London, S.W.1. Price 2s. 6d., post free.

Shell-moulding Process

Notes on the British Patent Position

The following statement has been issued by Lord Trefgarne, as chairman of the directors of the Polygram Casting Company, Limited :—

"The original conception of the shell-moulding process was due to Johannes Croning, of Hamburg, who at various dates between 1937 and 1947 developed the process in Germany up to the elementary stage disclosed in an official document published in the United States and the United Kingdom. This document is known as the Field Information Agency Technical Final Report No. 1168 (known for short as F.I.A.T. Report), which was published on May 30, 1947. Prior to the publication of this Report, however, a number of patent applications were made in the United Kingdom and elsewhere by Polygram Casting Company, Limited. Some of these applications have now been accepted, and a large number of additional later applications covering important new features of the process or its mechanization are owned by the company.

"Although the original conception was that of Herr Croning, it is only since the war that methods, especially methods of mechanization, have been developed to the stage of commercial application. Polygram Casting Company, Limited, are now able to state that their patent position, being based on new features, constitutes not only a strong positive patent position, but a measure of practical assurance against claims by third parties for infringement. The company makes this statement with unique knowledge of the patent situation in this field.

"In considering, therefore, the strength of the Patents protecting the Polygram Process, it would be a serious mistake to assume that in its commercially practicable form it is open to free exploitation, and that no Polygram licence is necessary. Whether or not any early features of the process are affected by post-war legislation in any individual country, no subsequent development for which a United Kingdom or United States or any other Patent (or Patents) has been or may be granted is affected by any such legislation. The position in the U.S.A. was succinctly put in a report issued for the guidance of the United States foundry industry in 1952 by the Office of Technical Services of the United States Department of Commerce, Washington. 'Naturally,' said this Report, 'if a U.S. Patent or Patents should be granted on specific improvements, an industrial user must not employ such improvements without obtaining a licence from the patent holder.'

"In the United Kingdom and in certain other countries, the Polygram patent position is much stronger than the corresponding patent position in U.S.A., for reasons which will become clear in due course, and these patent rights apply not only to the new mechanical inventions issued by Polygram, but to certain features of the shell-moulding process itself.

"The sum of these new developments (while utilizing the basic principle of investment of metal patterns by a mixture of sand and thermo-setting resin) build up into what may fairly be called a distinctive technique. To this technique the company has given its name, and it is now known throughout the world as the Polygram Shell-moulding Process. It is the Polygram Process which is the subject of licence to a considerable number of British and overseas firms. The Polygram Casting Company owns Patents and patent applications* of which the official numbers are listed in a footnote.

"Many of the claims identified above, date back from one to six years and it must be obvious that companies who embarked later than Polygram on experimental work many find, after much delay and expense, that their developments are already ante-dated by pending or complete Patents.

"In addition to its patent rights, Polygram Casting Company possess extensive experience and "know-how" gained during the past six years. Some years ago Herr Croning paid various visits to their works, the official consent of the Board of Trade having been given for the exclusive use of his advice. The Polygram Process is more technically described in a detailed manual of operation which, like the right to use its patent rights, is made available only to the company's licensees. Among these licensees are a number of firms of the highest standing.

"Patent applications are not published until a complete specification has been accepted, and in the present state of congestion in the Patent Office it may take some time before the whole of Polygram specifications, dated from January, 1947, onwards. emerge for public scrutiny. A number of these, however, have been published, and rapid progress is now being made, especially with the Patents for mechanical application.

"The delay in completing Patents, it should be explained, does not affect the date from which they are valid when granted."

* United Kingdom: 646223, 668821, 674422, 677434, 14963/51, 14964/51, 14965/51, 20521/51, 20522/51, 15407/52, 20081/52, 20082/52, 21782/52, 674421, 681368. U.S.A.: 307644, 307645, 293528, 307646. Canada: 635869, 632165, 635870, 635871. Australia: 10805/52, 4652/51, 4653/51, 4654/51, 12201/52. South Africa: 383/47, 384/47, 10444, 2155/51, 385/47, 2156/51, 10443, 2157/51, 2072/52. India: 47500, 47501, 47502, 47976, 40441, 45346, 47519. Pakistan: 3496.

Institute of Australian Foundrymen

The first annual convention of the Victorian division of the Institute of Australian Foundrymen was held in Melbourne last Friday and Saturday. The meeting consisted of four sessions and concluded with the annual banquet at the "Delphic." Three sessions were devoted to the discussion of papers and one session to a visit to General Motors-Holden, Limited. The programme included the following:—Official opening, address by Mr. E. Sheppherd; *Papers*, "The Ajax Pump Works, Kyneton," by J. Kellett; "American Experience with the Basic Cupola," by S. F. Carter (American exchange); "Air Volume Control in the Cupola," by R. Davidson; "Moulding of a Low-pressure Cylinder for a 25,000 k.w. Turbo-alternator," by A. Woodaman and R. Taylor; "Modern Ideas on Core-making." (exchange paper from the Institute of British Foundrymen), by C. S. Johnson and D. T. Kershaw; "Trend in Core-sand Usage," by W. Dummett; "Some Properties and Applications of Hard Chromium Plating," by C. J. Cocks and "Useful Aids in the Non-ferrous Foundry," by G. Adams.

Gamma Radiography in the Foundry*

By R. J. Hart

The work of scientists in developing radioactive isotopes for medical, biochemical and industrial use is proving of immense value to the whole community. Although, at the present time, three isotopes only are used for heavy industrial radiography, these have outstanding possibilities, enabling industrialists to improve their products and to attain a standard of quality hitherto rendered impossible of achievement due to the "undetectable defect" factor. In recent years, many excellent Papers have been presented at various times dealing with both X-ray and gamma-ray radiography in industry, but, in the opinion of the Author the more highly scientific and technical aspects of the subject have overshadowed its practical application. An attempt will be made in this Paper to outline the advantages of radiography for routine inspection of castings.

How Defects are Registered on Photographic Films

The fundamental principle underlying the formation of shadow images of interior defects is that metal objects are semi-transparent to gamma or X-rays. The intensity of the rays decrease steadily as they pass through metal, and in the case of gamma rays each one inch of steel through which the rays have to pass reduces their intensity by approximately one half. If the rays, for instance, pass through a two-inch steel plate, the first inch cuts the beam to one half its intensity and the second inch reduces it again by half, so that the intensity emerging is one fourth of that of the entering beam. Therefore, if the object be a casting with a wall thickness of two inches, in which there is a blowhole one inch in diameter, the beam passing through the centre of the blowhole will be twice as strong as the beam through the sound part of the wall.

When these emerging rays strike the photographic film at the back of the casting they affect it in proportion to their intensity and the time of exposure. As in taking a radiograph all portions of the film are exposed for the same length of time, the variations in the blackening of the film after it is developed shows variations in the intensity of the rays that emerge from the casting. Fig. 1 is an attempt to show diagrammatically how the density of the image on the film is affected by the presence of defects in a section of uniform thickness. The number of vertical lines shown in the diagram is an indication of the density of the shadow image on the film. Defects A and B are the same size but A will appear larger on the shadowgraph due to the angle of projection.

Unreliability of Destructive Testing

For many years, the destructive testing of cast metals has been the accepted means of checking the quality of castings. These tests included sectioning, breaking or machining, and apart from the fact that this procedure was wasteful and costly, the results were often unsatisfactory and misleading. Fig. 2 illustrates the unsatisfactory and costly method of destructive testing. This steel casting (weighing 6 cwt.) was sectioned as required by the specification, the operation taking approximately 20 machine/hours. It will be noticed that a large portion of the casting remains unexamined. No defects were exposed and the casting was pronounced satisfactory. Fig. 3 illustrates the same type of casting as radiographed. Four exposures were made using twelve films. Small shrinkage cavities were revealed in the bearing ends. These defects were chipped out and the casting welded. By a slight alteration to the feeding heads, the trouble was overcome on subsequent castings.

When sectioning a casting, the object is to cut through the casting at positions where a defect may occur and either (1) be exposed during machining or (2) weaken the casting and be a cause of failure in service. The position of the cuts is often a question of opinion or even guesswork. Fracturing a casting is even more unsatisfactory and in many cases impracticable, the fracture being likely to occur at the weakest section which in itself may be perfectly sound. Perhaps the best method of destructive testing methods is completely to machine a casting to well below the finished dimensions, and to examine the surface for defects after each tool cut. Unfortunately, due to design, very few castings lend themselves to this method.

When considering any form of destructive testing, three important factors must be taken into account:—

(1) All defects should be revealed which may cause failure in service or rejection after machining. Past experience has proved that this is not always possible.

(2) Although a percentage of production castings are destroyed in order to ensure that a desired standard is maintained, the results may still prove unreliable.

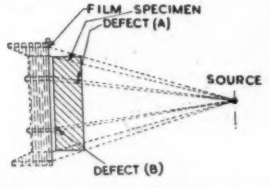


FIG. 1.—*Diagrammatic Sketch Illustrating Shadow Density on a Radiographic Film.*

* Paper presented to the Buxton Conference of the Institute of British Foundrymen, with Dr. C. J. Dadswell in the chair. The Author is chief inspector, Lake & Elliot, Limited.

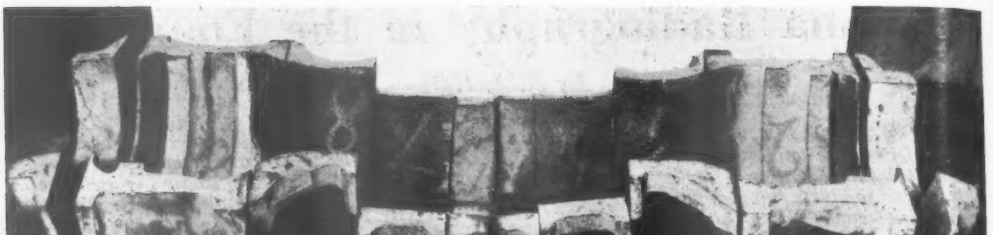


FIG. 2.—*Top-half Steel Axlebox, Sectioned as required by the Specification.*

(3) The economics of destroying a potentially-sound casting must be considered.

Applied radiography as a testing medium reduces considerably the uncertainty associated with destructive methods.

The foundries with which the Author is associated are at the present time producing approximately 180 tons of finished steel and iron castings in equal proportions per week. The majority of the steel castings (weighing from 50 to 1,500 lb. each) are for high-pressure/high-temperature service. In recent years, output has included a high percentage of chrome-molybdenum and other alloyed steels for use in the petroleum and chemical industries. It will be realised that failure due to a faulty casting even after years of service might have disastrous if not fatal results.

Introduction to Radiography

For a number of years, castings were submitted to a well-known contracting firm for X-ray examination. The results were of considerable value and serious thought was given to the possibility of installing X-ray equipment. It was found that unless very high voltage equipment is used it is impossible to radiograph castings with very thick sections or to accommodate substantial variations of thickness on one film. Again, the "setting up" of castings for X-radiography takes up valuable time and only a limited number of castings can be examined owing to this time factor. Early in 1948, a series of radiographic tests were made with radon, which were most encouraging, and these tests were repeated at intervals. Unfortunately, the "half-life" of radon is only 3.8 days, and therefore it can only be employed for continuous work at considerable cost. With the introduction of radioactive isotopes, with much longer half-life than radon, the field of non-destructive testing is widened, and the advantage offered by these iso-

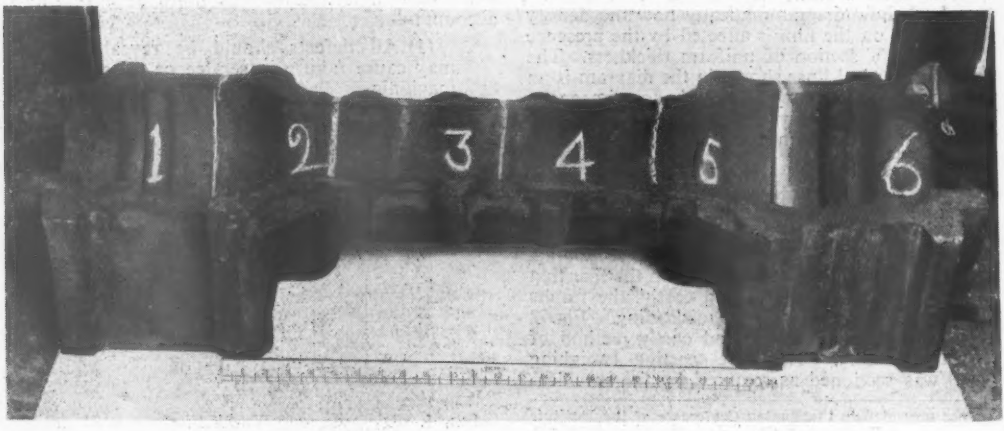


FIG. 3.—*Top-half Steel Axlebox as Radiographed, showing the Film Positions.*

topes convinced the Board of directors that by this latest development, quick and efficient examinations of castings could be made.

Choice of Isotopes

Early in 1950, the firm obtained a 4 by 4 mm. Tantalum 182 source of 500 mC. and routine inspection was commenced. Good results were obtained on castings with a sectional thickness of 1¼ to 2½ in., but, above and below these sections the results were not satisfactory. Subsequently, a 750 mC. source of Iridium 192 was used. This is an isotope which emits softer gamma rays than Ta 182, with added scope for examining sections below 1¼ in. Later, in order to cope with the number of castings scheduled for examination, two 6 by 6 mm. Cobalt 60 sources of 650 mC. were obtained. This enabled the staff to speed-up work considerably, and results compared very favourably with those tantalum when examining sections over 1½ in. thick. Table I lists the sources at present in use.

TABLE. 1.—*Isotopes in Current Use for Foundry Radiography.*

Source.	Half-life.	Source sizes, mm.	Approx. thickness range for steel (in.)	Remarks.
Cobalt^{60} ..	5.3 years	2 by 2 4 by 4 6 by 6	1 to 6	Although activation is rather slow (it takes approximately 30 months to prepare a 6 by 6 mm. source of 500mC.), the long half-life of Co^{60} makes it more economical than Ta.
Tantalum^{182}	120 days	2 by 2 4 by 4 6 by 6	1 to 6	This isotope has similar radiation characteristics but gives slightly better definition on the lower-thickness range than Co.
Iridium^{192} ..	70 days	2 by 2 4 by 4	¼ to 1¼	Despite the short half-life, this source emits softer gamma rays than Ta, making it particularly useful for thin sections.

Practical Radiography

It was realised that for radiography to be of full value, it was necessary to employ a system which would be of greatest assistance to the foundryman. Therefore, it was decided to concentrate on prototype castings. Before a sample was examined a sketch of the casting showing the type of runners and feeders was studied, and a decision made as to positions and number of films required. In the early stages the staff was able to examine 15 to 20 castings each week, using an average of five films per castings. This number was increased and at present many times this number are examined by radiographic means in the same period. Exposures are made at three times during the day and night at 8.30 a.m., 12.30 p.m., and again at 5 p.m., the last one being an "all night" exposure.

To simplify the assembly of the castings, the floor of the exposure building is marked off in circles of various diameters. This saves considerable time and avoids the use of measuring instruments. The

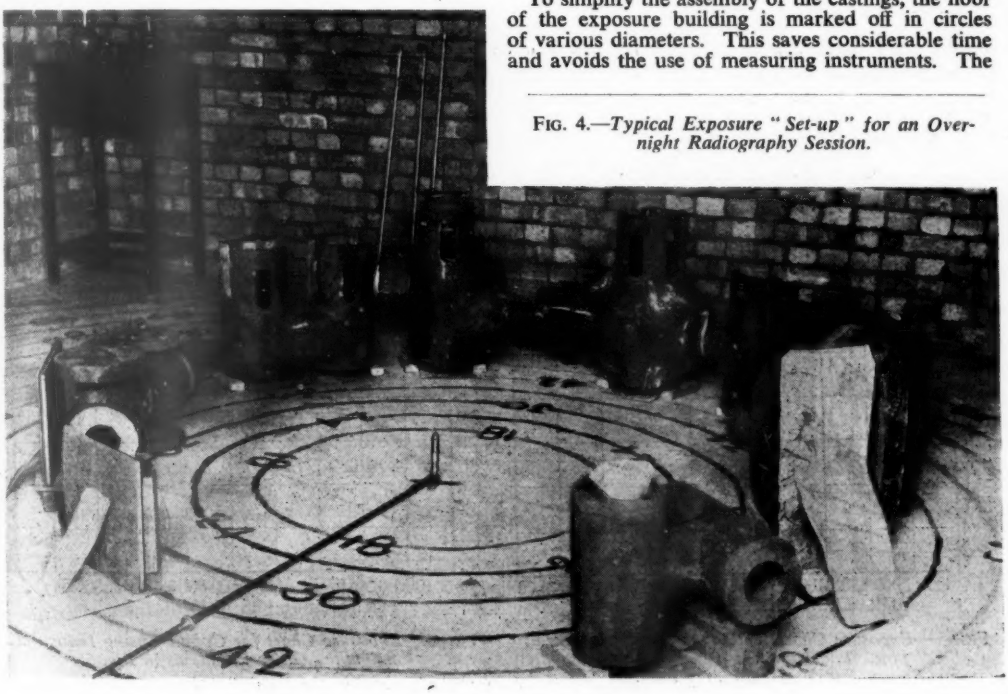


FIG. 4.—*Typical Exposure "Set-up" for an Overnight Radiography Session.*

source is then placed at the centre of the circle, after the films are in position on the castings. Fig. 4 shows a typical exposure "set-up" for an over-night session. The source containers and handling rods are shown in the background. To establish a constant film density, a series of check tests were made from which a series of simple charts were designed. Reference to these gives the correct source-to-film distance for the isotope and type of film selected. Figs. 5, 6, 7 and 8 illustrate the charts now in use, which enable the castings to be placed in position by unskilled labour, leaving more time for the radiographer to prepare and process the films.

Operating Details

Wide use is made of plastic cassettes which are ideal for placing in both internal and external radii and awkward corners where the flat type of cassette is useless. This is illustrated in Fig. 9. Lead-foil intensifying screens with a thickness of 0.005 in. are used at the back and front of the films and great care is taken to ensure that both these and the backing cardboard sheets are flat and free from buckles.

For day-time exposures, the standard non-screen films are usually employed due to the limiting time factor, but fine-grain films are used for the "all-night" session or during week-end exposures. Undoubtedly the latter are superior and, despite the fact that they are three times slower than the standard type, the resulting radiographs justify their use wherever possible. Stepped, wedge-type penetrameters are used with each exposure to ensure that adequate sensitivity is maintained. There is much controversy as to the best design of penetrameter, some preferring the wire type to the stepped wedge, but, in personal experience, the Author considers the latter to be superior and more convenient on smaller castings. Although a sensitivity of 2 per cent. is the requirement of the majority of specifications, in practice it is found that on the thinner sections a sensitivity of 1 per cent. or even lower can be attained.

A well-equipped dark-room with appropriate apparatus has been built and great care is taken to ensure that this room is kept free from dust, walls and floor being tiled. This extra expenditure is fully justified by the superior finish obtained on the films, as any dust which collects on the films whilst draining can completely ruin what otherwise may be a perfectly good radiograph. After developing, the radiographs are examined under proper viewing conditions by an inspector, the foundry foreman and a member of the staff of the methods' section. A detailed record is made of every exposure and a record card is filed with the film. These records are used for reference when castings of a similar design are to be made in the future. Fig. 10 illustrates how the records are kept.

A pilot casting is never passed as satisfactory for production until it has been decided that the correct foundry technique has been employed. In many cases, the feeding heads as well as the castings are radiographed. This enables the foundryman to assess the volume of metal required to feed a particular section. Check tests are made periodically on production castings.

Interpretation of Radiographs

Undoubtedly the most difficult problem in radiography is diagnosing the meaning of the shadows after the film has been processed. Correct interpretation can only be achieved by continuous study of defects as revealed by the radiographs. It is advisable in the early stages of the inexperienced radiologist to section specimens for correlation with the films.

The majority of defects have their characteristic outlines. For instance, blowholes are generally round in appearance and easily recognized. Sand

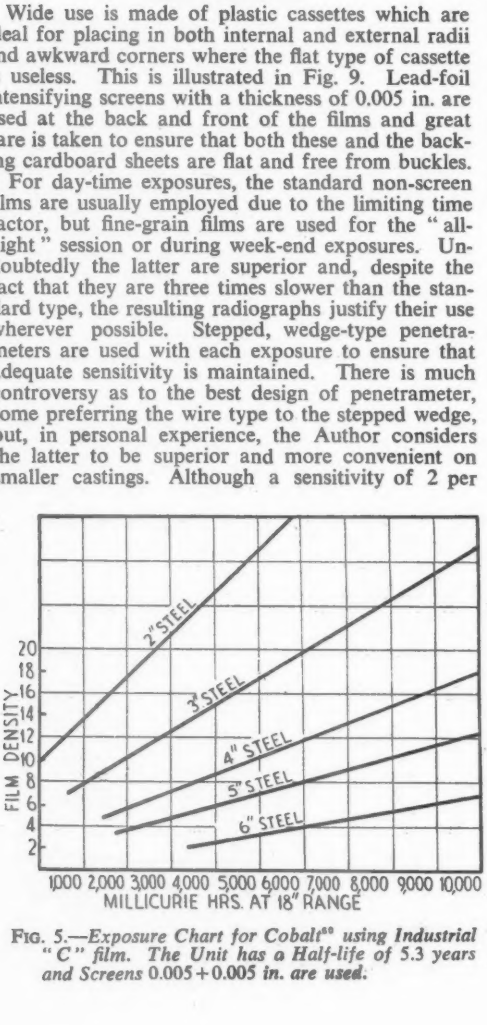


FIG. 5.—*Exposure Chart for Cobalt[60] using Industrial "C" film. The Unit has a Half-life of 5.3 years and Screens 0.005+0.005 in. are used.*

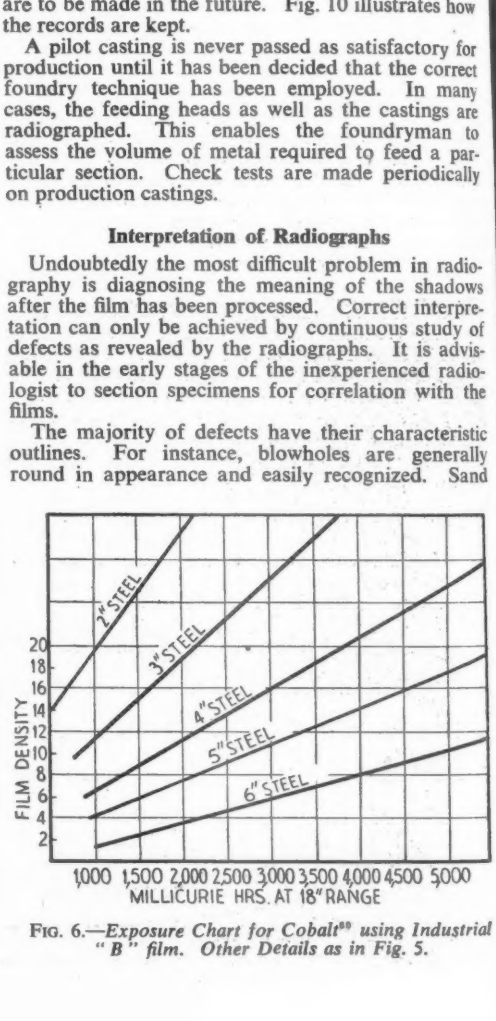


FIG. 6.—*Exposure Chart for Cobalt[60] using Industrial "B" film. Other Details as in Fig. 5.*

or slag inclusions are distinguishable from blowholes by their irregular outlines and by the fact that the density of the shadows varies considerably. Shrinkage cavities also have an irregular outline, but occur more frequently in the positions where a change of section is present. Hot-tears have the appearance of a continuous crack, but they do not usually follow a straight line and can be identified by their discontinuity.

No method has yet been discovered of satisfactorily photographing or reproducing radiographs. No such illustrations are therefore shown in this Paper. A number of radiographs to be exhibited at the Conference are mounted on the appropriate viewing screen to show the results obtained with various combinations of isotope and film.

Advantages of Radiography over Destructive Testing

The obvious advantage of radiography over destructive methods is that all types of defects in castings are revealed whether of a serious nature or not, and valuable machining time is saved on what might prove to be a scrap casting. As a further advantage to the foundryman, radiography enables him to achieve a standard of quality in castings hitherto limited by the uncertainty of knowing what hidden defects existed. With the aid of radiography, repairs made on castings with weld metal can be investigated and the quality of welding improved. By radiographing feeding heads, valuable data are collected and in many instances the volume of the heads can be reduced, thereby saving expensive metal.

The importance of recording the nature of defects revealed in castings cannot be over-emphasized. This presents serious problems if a casting is destroyed by sectioning. Radiography overcomes this difficulty as the films remain a permanent record, and can be used for reference for future work and to assure purchasers or inspecting authorities that a particular casting will meet with their requirements.

Every precaution is taken to ensure the safety of operatives from the effects of gamma radiation. Blood counts are taken at least every three months, and " personal films " are worn which are checked each week at the National Physical Laboratory. In addition, pocket " Dosimeters " are used and readings recorded daily. The highest weekly dose has at no time exceeded 0.10 Röntgen, which is well below the tolerance for that period. As a further precaution to protect all employees, the exposure room is remote from the main works building.

On first consideration, radiography would appear to be an expensive addition to foundry costs, but, in actual fact, the reverse is the case. After the capital outlay for equipment, considerable saving is made in material and man/machine hours. It is doubtful if many founders can produce actual costs involved when destructive methods of inspection are employed, but privately collected evidence proves that these costs exceed that of radiography.

Conclusions

The scientist has now placed in the hands of the foundryman an inspection " tool " in the form of radio isotopes for radiography which has outstanding possibilities and there is no reason why destructive testing should not be eliminated completely. As the micrometer replaced calipers as a more accurate means of dimensional measurement, so radiography replaces the unreliable and unsatisfactory system of destructive testing.

Although training is necessary, no highly scientific background is required of the industrial radiographer. On the other hand, the effectiveness of the process, the radiographer's ability to accomplish his task with a minimum of exposures and in a minimum of time, his ability in judging the seriousness of a defect in the object at hand, is a function of his experience and aptitude. Given an opportunity to observe and to follow the process involved in the correction of a defect discovered by radiography, the radiographer soon develops good judgment in the appreciation of the seriousness of a defect, and acquires background which will be helpful to him in the future tasks he is called upon to perform.

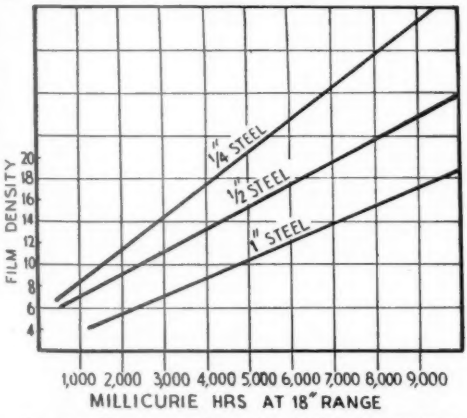


FIG. 7.—*Exposure Chart for Iridium*[192], *Half-life 70 days, using Industrial " C " film and Screens 0.005 + 0.005 in.*

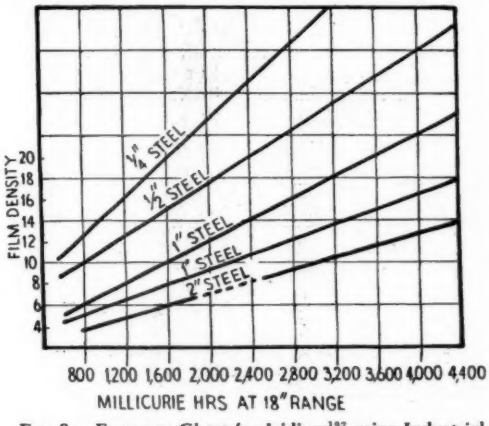


FIG. 8.—*Exposure Chart for Iridium*[192] *using Industrial " B " film; Other details as in Fig. 7.*

FIG. 9.—*Film in Position inside a Casting using a Plastic Cassette.*

Gamma radiography serves a two-fold purpose in affording the foundryman an opportunity to observe and improve his foundry technique and has a distinct advantage to the purchaser, insomuch, that valuable machining time is saved, which was previously spent on castings which were eventually rejected. There is no doubt that gamma radiography has " come to stay " and in the foundries with which the Author is associated, it has become standard inspection practice and is serving a most useful purpose.

Finally the Author wishes to thank the directors of Lake & Elliot, Limited, for permission to publish this Paper and for the facilities afforded for its preparation.

[Owing to a hitch in reporting the Buxton Conference, no accurate record is available of discussion contributions which followed presentation of this Paper. To avoid possible errors and omissions, it has therefore been decided not to print any discussion.—EDITOR.]

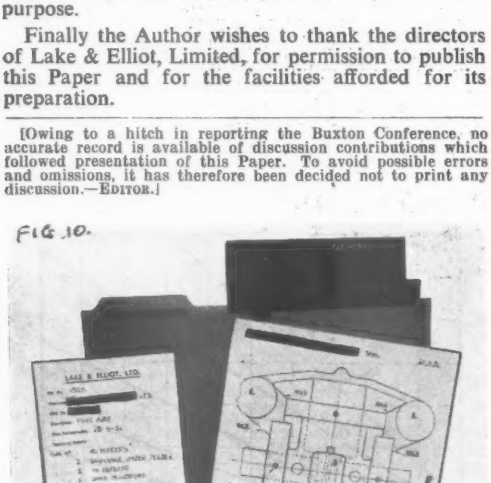


FIG. 10.—*Example of a Radiography Department Record Card; Sketch of Casting and Films ready for Filing.*

European Foundry Productivity

The establishment of permanent international contacts has been decided upon at a meeting of foundrymen from 12 countries. This decision was taken at the first European conference on foundry productivity, organized under the auspices of the O.E.E.C. by the French Productivity Centre and the *Syndicat Général des Fondeurs de France*, which took place from November 5 to 8 in Paris.

The meetings were attended by representatives of trade associations, heads of firms which have conducted productivity experiments and experts who have studied foundry productivity in the United States. The chair was taken in succession by Mr. Pierre Ricard, *président d'honneur* of the *Syndicat*; Mr. Pierre Grimanelli, secretary-general of the French Productivity Committee; Mr. Maurice Olivier, president of the *Syndicat*; Mr. N. P. Newman, president of the Council of Ironfoundry Associations; and Baron A. Krayenhoff, president of the General Association of Netherlands Foundries. American foundry experts also took part in the proceedings.

At an early stage, conditions under which productivity experiments were carried out in various countries were described. The speakers drew attention to the different economic and psychological techniques used in the foundry industry in various countries; at the same time, it was stressed that experiments on a national basis were of great value to European foundrymen. It was also recognized that much could be learned from American methods, which would, however, have to be adapted to European conditions. The first obstacle to increased productivity was admitted to be the conservative attitude of both employers and employees to any change in working methods. The specialists present emphasized that initiative must be shown, not only by individual firms, but also by the trade as a whole; workmen, executive staff and employers must co-operate in a spirit of mutual confidence. It was stated that when a new attitude had been created by improved human relations, it was much easier to carry out certain basic reforms in labour organization.

Principles Applied

These principles were illustrated with many practical examples of the progress already achieved in Europe towards increasing foundry productivity. In this connection, a number of founders emphasized the advantages to be gained by applying improved moulding methods, and in particular by the economic use of snap-flask moulding. Heads of firms described how handling costs—a very large item in total production costs—could be reduced at relatively small expense. They described how they had succeeded both in eliminating unnecessary handling and in selecting the best equipment, not only for continuous or semi-continuous production, but also for jobbing work. A " lasso-cable," a sort of shop cableway, for example, could help to speed the work and improve productivity considerably. In a series of foundry visits, delegates were able to inspect the results of productivity experiments in France.

Finally, the delegates stressed the importance of technical consultative services on foundry subjects and their part in increasing productivity. It was evident that technical centres such as the *Centre Technique des Industries de la Fonderie Française*, which was visited by delegates, could, by giving advice, help foundrymen to increase efficiency and reduce waste, thereby providing the basis for a sound productivity policy.

Symposium on Aluminium Casting

Papers presented in Birmingham and London

On November 6 and 7 in Birmingham, at the Queen's Hotel, and November 11 and 12, at Claridges Hotel, London, the Aluminium Development Association organized a symposium on the first day, and an exhibition on the second, of castings and methods. The symposium consisted of the presentation of a number of papers by authors well known in the light-metal founding industry from which the following extracts have been taken.

Introduction to Aluminium-alloy Castings

By D. C. G. Lees, M.A.

The Author refers to the use of metallic-arc welding for joining together two or more castings to simplify moulding, and reduce manufacturing costs, and comments on the good future prospects for the process. The idea that castings are inherently weak and brittle is now obsolete. As illustrations, the Lancaster undercarriage beam and the rear-axle casting used in a French production motor-car, are given. Strong materials, such as B.S. 1490 alloy carrying 10 per cent. magnesium, will give a minimum tensile strength of 16 tons per sq. in. with a specific gravity of 2.55, that is, a u.t.s. to s.g. ratio of 6.3 to 1. Again, AB2 alloy in B.S. 1400—an aluminium-bronze containing 3.5 to 5.0 per cent. each of iron and nickel, and 8 to 10.5 per cent. of aluminium—the specified minimum tensile is 40 tons per sq. in., the specific gravity is 7.55, giving a ratio of 5.3. The Author describes and illustrates die-cast rotors used on account of the good electrical conductivity of the aluminium alloy, and a marine radar display unit used because of its non-magnetic properties.

Importance of Standards for Aluminium Castings

By E. Elliot and F. H. Smith

This Paper explains how the tried and established compositions have become the subject of official British standards, and gives some indication of how compliance with these standards is ensured. Several examples are cited of when faults in service have developed through using non-standard material. The last section of the Paper deals with inspection methods.

Survey of Some Researches on Aluminium Founding

By W. A. Baker

This Paper reviews the research work which has been carried out to ascertain such properties as the flowing power of various alloys; shrinkage; mechanism of solidification and of hot-tearing; and the origin of porosity. Consideration is given to the influence of grain-size and its control. Gas absorption is covered in some detail, and data are given of the apparatus for detecting gas before metal is poured, and estimating the quantity. Under the caption "Optimum Rates of Solidification," it is shown how the overall rate of freezing of a casting affects its soundness. Finally, there are some notes on the properties of moulding materials, the disposition of runners and risers, and the design of castings.

Developments in the Finishing of Aluminium Castings

By A. Fenn

Under six headings—(1) mechanical finishes, (2) painting, (3) electro-plating, (4) anodizing, (5) vitreous enamelling, and (6) hard-surfacing—the whole subject of surface treatment of aluminium castings is brought up to date. The case of vitreous enamelling still requires much more investigation before commercial success is established. More promising is the process of hard anodizing, and if the results conform to the preliminary examinations, many new applications for aluminium can be expected, such as for gears, pinions, and the like.

Assembly of Aluminium Components by Welding

By H. W. Keeble

This Paper shows how the much-talked-of conception of welding two or more castings—simple to mould when separated—has been developed to the stage of practical production. Examples are given of a magnetic coolant separator (Figs. 1 and 2), and a yeast-collecting vessel. In the latter case, however, cast-aluminium rings are welded into a wrought-aluminium body.

The magnetic coolant separator, the purpose of which is to remove metallic particles from coolants used in machining, is made in four sizes, each being a development of the same basic design. The housing is not heavily stressed and aluminium-alloy castings are used because lightness in handling and moving the unit is required. Their lower machining costs in processing and their non-magnetic characteristic are also desirable features. To facilitate the production of the housing in the foundry, and to reduce the number and value of castings that must be held in stock, the job was broken down into five parts. The only difference between the various sizes of separators was in the width; hence the two side pieces were standard for all sizes of the unit and to secure different sizes it was only necessary to have different inner castings. These three inner castings were quite simple and cheap to make, both in the patternshop and in the foundry. The side casings, too, were straightforward jobs requiring only inexpensive pattern equipment.

Symposium on Aluminium Casting

Recent Developments in Aluminium Foundry Practice

By E. Player

The Author has confined his remarks to (1) moulding methods, including expendable materials such as sand, plaster, etc., permanent moulds and pressure die-castings; (2) development in foundry equipment, and (3) development in alloys. The section devoted to precision plaster moulding details the production of castings of a high degree of dimensional accuracy and perfection of skin. Plaster is used because, by varying its composition, the mould parts can be made to expand slightly, to contract, or "to stay put." In an example cited and illustrated, a 26-in. dia. rubber tyre mould was held to a variation within ±0.005 in. Illustrated descriptions of both permanent-mould and pressure die-castings were included, useful data being quoted for the maximum size, dimensions of cored holes and the like.

Two Papers quoting interesting examples of aluminium-alloy castings were given by Mr. A. Eyden, and Mr. G. L. Turner, Mr. J. W. James and Mr. A. Ratcliffe jointly. The first describes the making of an aluminium automobile cylinder-block as a die-casting, and Mr. Turner and his colleagues detail some unusual examples of pattern and die construction. The automobile cylinder described by Mr. Eyden is quite a complicated component for Jowett-Javelin cars. It weighs 22 lb., carries one sand core and two sets of loose cores for the cylinder bores, and a further six for the top of the casting. The second Paper describes in detail the making of the "Dunlopillo" mattress mould and a lubricator body die-casting. These are both complicated castings involving special techniques.

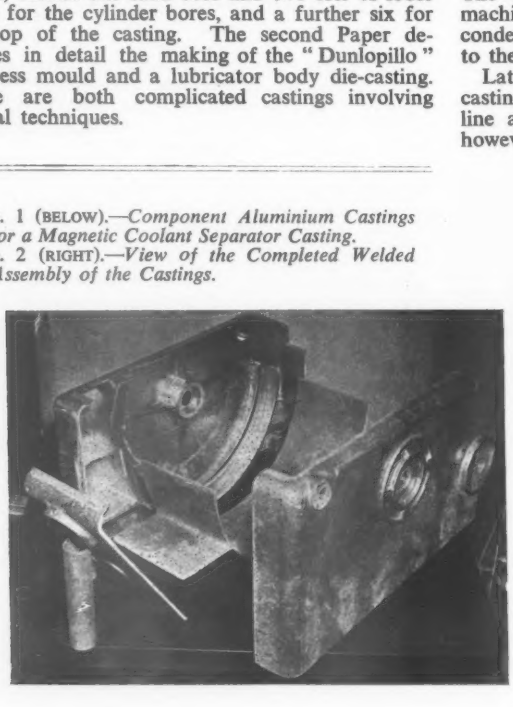
A third Paper in this series, "Aluminium-alloy Castings made with Cast-in Inserts," by J. Caven, is an extremely practical Paper. It first lists the types, nature and materials of inserts, which can satisfactorily be incorporated when pouring aluminium-alloy castings—sand casting permitting the greatest freedom of selection. Then, after a short description of methods of securing inserts in the mould, illustrated by examples, the balance of the Paper is devoted to details of mould construction, layout, and precautionary measures to be taken for two interesting examples. These are the casting-in of bearing-housing inserts into a trunnion bracket and a gland casting into which a spiral copper tube is cast for cooling purposes. In this latter case, 120 lb. of copper is embodied in a composite casting weighing 260 lb. though 220 lb. of surplus metal has to be poured, mainly for the feeding head.

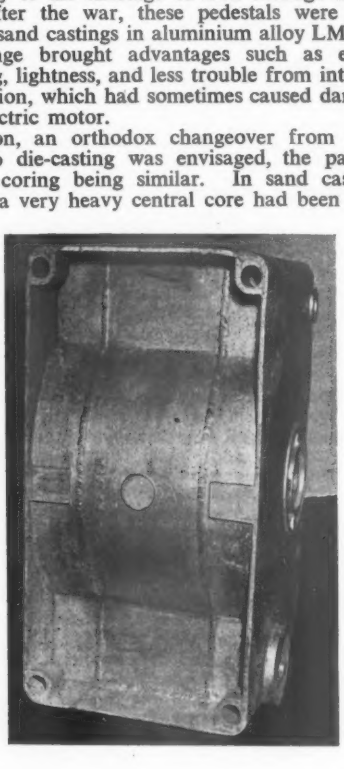
In this series, a Paper by H. C. Cross deals with the base and main structure of a dental stand where there was a change-over of material from cast iron to cast aluminium, with attendant advantages, and a subsequent change from a sand casting to a gravity die-casting.

Components of the type were formerly made in cast iron and these were quite satisfactory, but considerable labour had to be expended on them to produce the final enamelled finish required. Due partly to the shortage of iron castings immediately after the war, these pedestals were produced as sand castings in aluminium alloy LM6-M. The change brought advantages such as easier machining, lightness, and less trouble from internal condensation, which had sometimes caused damage to the electric motor.

Later on, an orthodox changeover from sand casting to die-casting was envisaged, the parting line and coring being similar. In sand casting, however, a very heavy central core had been used

FIG. 1 (BELOW).—*Component Aluminium Castings for a Magnetic Coolant Separator Casting.*
FIG. 2 (RIGHT).—*View of the Completed Welded Assembly of the Castings.*





and it was clear that this core would prove both expensive to make and difficult to handle in the die foundry. To avoid this, it was decided to split the casting down the centre line and, by using two separate dies, mirror images of each other, to produce two parts which subsequently could be joined together with a suitably-concealed joint. After due consideration, however, it was decided to join by welding. Argon arc welding was first considered but unfortunately the cost in this instance did not make it an economical proposition and metal-arc welding was therefore used and has proved satisfactory.

Design of Aluminium-alloy Castings

By L. Fletcher

In the Paper on design, first, the designer's attention is called to the properties of the standardized range of alloys available, and then he is shown a series of designs. By using these, moulding processes will be much simplified without detracting from the form ultimately desired. The examples are sufficient to interest designers in the subject, and cause them to be co-operative initially.

Future Outlook for Aluminium Castings

By L. R. Carr, M.A., M.P.

The Author includes two tables in his Paper on the future outlook of the industry, one of which shows how the production of aluminium castings has risen from 29,000 tons in 1940 to 72,300 tons in 1952, and this still appears to be increasing. The second table sets out the percentage consumption by the various user interests from 1948 to 1951. The aircraft industry (until last year when it rose to 12 per cent.) was running between 5 and 6 per cent. The biggest customer (43 to 48 per cent.) was road transport, including tractors, agricultural machinery, and I.C. engines. The Author shortly reviews the prospects for each main consumer.

Exhibition

Aluminium adapted to a remarkable variety of uses was strikingly illustrated at the exhibitions arranged concurrently with the technical sessions. Among the most interesting exhibits was a German bicycle thought to be the first in the world to incorporate a main frame of cast aluminium. The Association obtained the machine through its German counterpart, and it is expected that the bicycle will attract the interested attention of British manufacturers, who have hitherto argued that it is desirable to have steel tubes in a bicycle, or, if aluminium be used, that it must be welded or brazed. The German machine, with its cast-aluminium frame, weighs 37 lb. 14 oz. and the frame alone, which is roughly in the shape of a cross, weighs 5¼ lb. The price of the bicycle is the equivalent of approximately £15.

Non-foundry exhibits included jewellery, such as brooches and bangles, made of special aluminium wire cut with facets to reflect light and colour anodized in various shades, the whole effect being very attractive. Exemplifying the adaptability of aluminium from æsthetics to utility, there was also on show an aluminium dental plate which was in course of being treated by the Army Dental Corps. It is said to be more comfortable than the plastic plate and less liable to crack.

House Organs

The Hallford Magazine. Vol. 1, Nos. 6, 7 and 8. Published by J. & E. Hall, Limited, Dartford.

The receipt of three issues of a works magazine does enable a reviewer to get a proper appreciation of its character and worth. How few concerns possess such a plethora of social activities as this famous Kent firm of engineers and founders. Actually 14 are listed. Moreover they are all active, and their doings naturally take up much space—especially as the magazine is profusely illustrated. As a magazine for internal circulation, there are few, if any, superior in the industry.

Renishaw Works Magazine, Vol. 1, No. 1, published by the Renishaw Iron Company, Limited, near Sheffield.

This modest magazine benefits from its small format, and is composed of easily-read articles, or perhaps they should be called notes. The result is that it will all be read, as readers tend to skip solid blocks of type. A good beginning has been made and the reviewer sends his best wishes for its future success.

One Hundred and Eleven—Golden Jubilee Issue. Published by the Hammond Lane Foundry Company, Limited, 111, Pearse Street, Dublin.

The reviewer congratulates this famous Irish foundry on the attainment of its Golden Jubilee. The founder, Mr. D. Frane, who died in 1946, purchased a derelict building in 1902. In a few years time, he was joined by the late Mr. Thos. Buchanan and their joint efforts resulted in the establishment of what is now the largest foundry group in Eire. It was expanded from a single unit into a large group with many and varied interests. This issue recounts this growth in a series of well-illustrated articles.

Ad Rem No. 4. Published by the Butterley Company, Limited.

This issue tells of the passing of the Mining Association of Great Britain, which once ranked amongst the most important employers' associations in the country. Mr. E. Fitzwalter Wright, as its last president, was the recipient of gifts from his colleagues to mark this honour. The reviewer suggests that "La Vie Parisienne" type of illustration such as appears on page 23 is out of place in a house organ, which, one presumes, enters into the homes of quite a number of serious-minded people.

Carron Cupola. Issued by the Carron Company, Falkirk. Vol. 3. No. 3.

The Editorial of this issue is written by the manager, Mr. R. W. Payne. He is something of a psychologist for in dealing with safety first he has used the expression, "He was not very intelligent." This is the sort of remark which will be taken to heart. This magazine is increasingly resorting to pictures. The reviewer queries the wisdom of this for if it continues the next generation will scarcely be able to read.

Correspondence

[We accept no responsibility for the statements made or the opinions expressed by our correspondents.]

IRON AND STEEL BILL*

To the Editor of the FOUNDRY TRADE JOURNAL.

SIR,—Mr. Kain's apology I accept with the same bonhomie that he shows. Why does he immediately proceed to be-devil the issue by his expression "the secrecy surrounding negotiations"? I feel sure any negotiations Mr. Kain undertook, involving a major business change, would initially demand—and receive—"caution" from all parties. Similarly, discussions with ministers intent upon a change of policy, demand that talks be treated "confidentially" in their initial stages.

Whilst he was at it, Mr. Kain might have carried his declension from "initial confidentiality" to "surrounded in secrecy" one stage further and reached "conspiracy of silence." But, Mr. Editor, we are both engaged in an ancient and honourable industry, so let us leave distortion such as this to the "muckrakers" of popular journalism.

Mr. Kain asks "Can I produce the minutes of any meeting of any constituent Association which deals with J.I.C. negotiations on the Government proposals prior to the issue of the White Paper?" The answer is "Yes":—

December 13, 1951—The chairman made a full statement to C.F.A. council of the negotiations to date with the Minister of Supply and J.I.C. (minute No. C.124). A long discussion followed the chairman's report, after which it was unanimously adopted.

December 18, 1951—A lengthy *résumé* of the foregoing was presented to the executive committee of the Manchester & District Ironfounding Employers' Association (minute 3(*d*)).

February 12, 1952—A further progress report was given to the C.F.A. executive and finance committee by the chairman, and the minutes of this meeting were circulated to the full council of the C.F.A. (minute No. E.200).

Early March, 1952—Every ironfounder in the country received the C.F.A. annual report for 1951, on the first page of which appeared as frank a statement as possible of the Government proposals for the iron and steel industry.

March 19, 1952—The quarterly meeting of N.I.E.F. discussed all the proceedings to date and the information known at that time, and only one representative indicated any disapproval (minute No. 19).

March 20, 1952—At the C.F.A. council meeting a very long and wholly comprehensive statement was made by the chairman, and this was approved (minute No. C.145).

April 8, 1952—The Manchester Association received a special report on the C.F.A. meeting of March 20, 1952 (minute No. 5).

June 19, 1952—The chairman stated that no fresh information was available concerning de-nationalization (minute No. C.162).

July 18, 1952—The White Paper was published, and within a day or two the C.F.A. gave wide circulation to the comments which appeared in the nation's leading newspapers.

In conclusion, may I express the hope that your readers (and correspondents), in considering J.I.C. policy and the C.F.A. support thereof, will avoid the self-deception induced by such clichés as:—"Selling the pass," "falling at the first fence," "the putting on of shackles," "getting knocked out in the first round," "putting the industry on a plate," "acting unconstitutionally," or any other device which aids loose thinking.

Believe me, Sir, this industry of ours, by creating the C.F.A. and the J.I.C., has something to be proud of. It should be made aware that every one of the individuals on its councils and its committees is inspired by the desire to enhance the prestige of ironfounding—to safeguard the interests of its members—and to help the industry make its full contribution to the general well-being of the country.—Yours, etc.

THOMAS LEE,
Director,
Henry Hollingdrake & Son, Limited.

November 13, 1952.

To the Editor of the FOUNDRY TRADE JOURNAL.

SIR,—With regard to Mr. Shepherd's letter in your issue of November 13, I am very much in agreement with most of the points to which he draws attention, but I would like to add that many ironfounders and M.P.s are greatly disturbed to think that there should be a proposal to impose controls on more than two thousand foundries.

The foundries escaped this fate at the time of the Labour Steel Nationalization Act, 1949, and it is incomprehensible to think, that, at a time when controls in general are being relaxed, foundries should be made subject to the supervision of the proposed Iron and Steel Board.

Part of the Government's reply seems to be that although the controls are to be statutorily imposed, they will only be applied to the foundries with a very mild hand. In that case why should they be imposed at all? What causes particular anxiety to the foundries is that sooner or later, in the nature of things, there will be once more a Labour Government, and in that case they will find the foundries nicely parcelled up, all ready for nationalization. As one foundry says, it is like handing out the iron foundries on a silver platter for nationalization.

De-nationalize steel? Yes! but leave iron castings entirely out of the question.

We may all hope that the course of events will remove this nationalization question from the political arena, but in view of the clear statements by Mr. Attlee, Mr. Morrison, Dr. Dalton and Mr. Strauss that they are determined on re-nationalization, is it a reasonable thing to do to expose iron castings to this risk?—Yours, etc.

T. WHITHAM,
Managing Director,
Blakey's Boot Protectors, Limited, Leeds 12.

November 14, 1952.

EXPERIMENTS ARE BEING CARRIED OUT by Wm. Doxford & Sons, Limited, Sunderland, on the possibility of increasing the power of its two-stroke opposed piston engine. At present engines of this type up to 8,500 b.h.p. on a single shaft are built, but inquiries have been received as to whether engines up to 14,000 b.h.p. could be constructed.

THE RECENTLY FORMED KING'S COLLEGE Stephenson Engineering Society, Newcastle-upon-Tyne, is to hold its inaugural meeting on November 28. One of the speakers will be Sir David Pye, president of the Institution of Mechanical Engineers. The society's first senior lecture will be given on December 11 by Sir Claude Gibb, chairman and managing director of C. A. Parsons & Company, Limited, who will speak on "Engineering Achievements on Tyneside."

* Cmd. 8619, H.M. Stationery Office.

German Foundrymen's Association

Annual Meeting at Düsseldorf

The 43rd general meeting of the German Foundrymen's Association, the *Verein Deutscher Giessereifachleute*, was held from September 25 to 27 in the Robert Schumann Hall, Düsseldorf, under the presidency of Mr. J. Küster. It was attended by over a thousand members, whilst the supper party at the Rheinhalle attracted no fewer than 1,200 guests, including those from many countries. Commendatore Olivo, of Italy, the president of the International Committee of Foundry Technical Associations, was present in his official capacity, and Mr. V. C. Faulkner represented the Institute of British Foundrymen. Amongst other well-known foreign visitors were Mr. G. Hénon (France), Prof. O. Hoff (Denmark), Mr. E. O. Lissel (Sweden), Mr. Robert Doat (Belgium), and Mr. Bush and Mr. Smith, of the Renshaw Foundry Company, Limited. Below are abstracted some of the more important papers presented.

Melting Control

The first paper, "Heat Balances in Hot- and Cold-blast Cupolas," by Dr. W. Patterson, of the Aachen Foundry Technical Institute, opened with an analysis of the calorific balances of cold-blast cupolas as have appeared in the technical Press. From these it was deduced that with current coke consumption the thermal efficiency is from 30 to 25 per cent., or even less in ordinary practice. Changing over to hot-blast, the efficiency is increased to over 40 per cent. This has been confirmed in practice by the students of the Aachen Technical Institute from tests taken in a Rhineland foundry. Information was given on the compilation of thermal balance-sheets for cupolas using hot blast, special attention being given to gas, and slag analysis.

The second paper, on "Technical and Economic Problems in the Production and Use of Foundry Coke," was given by Dr. Ing. H. Wubbenhorst, of Essen. The Author stated that the purely physical properties of foundry coke have an affect on melting practice in the cupola. In the first place, the strength of the coke and its structure have a profound influence, and the size of coke also influences its strength. In practice, the choice of coke-size will depend on the diameter of the cupola; the ash content and the moisture content being of less importance than the size and structure. The sulphur content is not so harmful as has been thought, and consideration should be given to its form of existence in the coke as well as in the metallic raw materials. As the balance sheet of the operation shows, the weight of the blast is greater than that of the coke charge, at least in cold-blast practice. Related to the quality of the coke, the blast control and its metering is of great importance in maintaining a correct blast/coke ratio.

For the production of melting coke well suited for cupola operation, a high-volatile coal with a not-too-high gas content is needed. Such coals are mined in the Ruhr basin and in the Aachen district, and are coked in horizontal retorts after grinding and mixing. The time of coking and the temperature play an important rôle in the technique of production. Moreover, the choice of the charge is of importance, whilst the width of the chambers, which do not differ greatly, has a profound effect on service use. In comparison with blast-furnace coke, foundry coke is processed for a longer time. For foundry coke, the costs of production being higher, a higher selling price is demanded and obtained.

The supply of foundry coke was difficult during the war, and immediate post-war periods. Since 1948, however, the situation has been improved, and sufficient supplies have been available to meet the increasing production of castings. Moreover, the consumption per ton of castings has considerably decreased.

A paper, "Influence of Scrap and Pig-iron on the Quality of Malleable Cast Iron," contributed by Dr. H. Siegel, of Hagen, points out that, when making malleable cast iron, black areas in the structure of the iron appear periodically. It would seem that these spots cannot always be attributed to the founder, but can be due to influence beyond his control. Examining this type of defect with a lens, as it shows up in the fracture in an as-cast casting, it is noticed that the structure consists, for the most part, of oxidized constituents due to the access of air. Therefore the conclusion that the defect occurs as a result of the process of solidification seems to be justified. The cause would, therefore, seem to be due to the period of solidification and can be attributed to the actual metal as affected during the melting process.

Experimental Work

Complicated castings were made as a basis for testing as well as spiral and shrinkage test-pieces. The tests were taken under normal foundry conditions and changes were made in the pig-iron and scrap proportions in the charge. The metal was cupola melted using the Freier-Grunder process. Evaluation of the test results showed that test-pieces do not portray the actual condition of the castings, but the shrinkage tests do give worthwhile information. Gas-content tests were also carried out on both sand-cast and heat-treated material. The oxygen contents of the quenched series were usually higher than in the sand-cast samples and from this fact it can be concluded that, during the slow cooling in the sand, reactions still continue, which tend to decrease the gas content. This is understandably due to the fact that the iron leaving the cupola is in an unstable condition.

A similar conclusion from the oxygen-content determinations was reported; that is, the oxygen contents can be high, as would be expected from the

German Foundrymen's Association

metallurgical balance in the actual metal and between the slag and the iron. The fracture referred to earlier was shown up by the shrinkage test. It can be proved that, by increasing the oxygen content, shrinkage in the iron also increases. This means that the shrinkage increases mainly due to the reactions between the carbon and oxygen in the iron. Moreover, in the large shrinkage cavities, the upper portion of the hole showed a smooth surface, which in general had the appearance of a ball, whilst the lower part had a dendritic structure.

Thus, as a result of the tests undertaken, it seems necessary to pay attention to the oxygen content in the liquid iron, for this oxygen content is the main cause of the cavities produced during solidification. Moreover, it is possible to extend the work to show that the oxygen content can be traced to rusty steel scrap used in the metal charge. In the tests, details of the influence of rusty scrap have completely overshadowed the influence of the pig-iron.

Machine-cast Pig-iron

Dr. J. Willens, in a Paper on experience gained when using machine-cast pig-iron for foundry use, first described the machine in use at the Ruhrort-Meidereit concern. The casting machine handles 1,500 tons of hematite and foundry pig-irons per day. Uniformity is assured by first teeming into a 40-ton mixing ladle. Moreover, this allows of the separation of the kish. In order to make a proper comparison, sand beds were prepared at the blast-furnace and the resultant pig-iron and that from the casting machine were tested. Different structures were noted. By modifying the rate of the filling of the metal moulds and their temperature, and also by water-quenching the pigs, different structures could be obtained. Using this method, in the case of hematite one could produce either coarse or fine graphite. Brinell hardness tests showed that the use of metal moulds did not invariably give higher readings than the sand-cast material. The spread of the readings indicated that the chill-cast pig should not be harder than sand cast.

These experiments showed that the chill-cast pig-iron was of a more regular quality and through control at the casting machine, definite structures can be assured. Its cleanliness and uniformity is generally appreciated by German founders.

Desulphurization of Cast Iron and Malleable with Lime and Coal-dust

By PROF. DR.-ING. K. ROESCH

Cupola melting of grey iron, malleable cast iron and iron for processing in the Bessemer converter usually requires a reduction of sulphur content. Poor-quality scrap and coke in recent times, however, have resulted in excessive sulphur. In casting steel, the formation of hot-tears is due to a high S-content, and it is specified that the S-contents shall not exceed 0.04 per cent. In the case of malleable cast iron, especially of black-heart, too high a S-content causes poor results durin the malleablizing process. In spite of this, however, an S-content of approximately 0.2 per cent. is specified when producing malleable cast iron for fittings, in order to facilitate the thread cutting. In the case of grey cast iron, a S-content of more than 0.1 per cent. is often too high for best-quality material.

It is quite possible to lower the S-content to less than 0.04 per cent. by melting in basic-lined cupolas, but the difficulties encountered coupled with the high cost of production do not seem to warrant extended practice. The more usual practice is to melt the iron cheaply in acid-lined cupolas, followed by a desulphurizing process, commonly by means of sodium carbonate. With a basic-lined ladle and by introducing a degree of turbulence, a decrease of 90 per cent. and more on the average is attained with 1.58 to 2.0 per cent. of soda ash. Instead of soda ash, lime and coal-dust can be used for desulphurization in high-speed rotary furnaces, basic-lined, which are closed during the processing.

By this process, the slag does not become melted and, after a few minutes' rotation, the S-content is rapidly reduced until after 15 to 20 minutes it is lowered below 0.02 per cent.

The chemical reactions are as follow:—

(i) $(MnFe)S+CaO+C=Fe+CaS+CO$. Desulphurization by means of lime/coal-dust.

(ii) $2(MnFe)\,S+2CaO+Si=2Fe+2CaS+SiO_2$. Desulphurization in presence of Si in the iron.

(iii) $SiO_2+2CaO=2CaO+SiO_2$. Release of the SiO_2.

(iv) $FeO+CaS=FeS+CaO$. Re-sulphurization by ferrous oxide.

(v) $FeO+C=Fe+CO$.

The decrease of temperature amounts to about 100 deg. C. and reheating may be called for after the removal of slag. The slag can be re-used several times after small additions of lime and coal-dust. This process, the details of which have been published by Mr. W. Oelsen, is currently applied in Germany and abroad.

Acid *v.* Basic Cupolas

"Comparative Costs of Acid and Basic Cupolas" was the subject of a paper given by Dr.-Ing. H. Schmidt. With the basic cupola, sulphur contents of less than 0.01 per cent. are attainable; thus the system is suggested as being well suited for the production of nodular cast iron, though starting off with a high sulphur charge. However, it is necessary to count on a double silicon loss, but the manganese loss is lower than in acid-melting practice. The advantages and drawbacks of the two processes are set out as follow:—*Acid, advantages*: (1) medium cost of cupola lining; (2) feeble carburization of the scrap, therefore useful for obtaining a charge low in carbon; (3) silicon loss at a minimum, and (4) minimum control requirements. *Drawbacks*: (1) large sulphur pick-up; (2) heavy loss of manganese, and (3) need for good quality coke. *Basic, advantages*: (1) ease of desulphurization; (2) possibility of dephosphorizing; (3) low manganese loss; (4) ability to recarburize scrap to a greater extent; (5) better metal-

lurgical control; (6) good iron as a basis for making nodular iron associated with a decrease in the consumption of the Mg-containing alloying material; (7) costs of melting often reduced; (8) permits of long runs as the wear of the lining is but slight, and (9) poor quality coke can be used. *Drawbacks*: (1) expensive to line; (2) heavy silicon losses; (3) high control costs.

The basic lining need only extend below a level at which reactions between the slag and the lining can take place. Such a lining could be made up of either chrome-magnesite or special magnesite bricks, but they are ruled out on account of their high price. Pure dolomite is only used to a limited extent for lining cupolas, because it hydrates under moist atmospheric conditions, and an improvement in the properties renders it so expensive that it enters the price range of cheaper kinds of magnesite. Practical attempts have been made to protect dolomite linings by mechanical means from destruction by the entry of atmospheric moisture, but, despite all experiments, there is still need for a repair material more in line with acid practice.

If the liquid iron from the acid-lined cupola is debited with a lining cost at D.M. 1.12 per ton, it is necessary to count on, for the basic-lined cupola —varying with size—a matter of D.M. 4.18 per ton when using a tar/dolomite mixture for the purpose; good magnesite works out at D.M. 4.23 and D.M. 3.83 using a cheaper grade. A comparison of the overall raw material costs shows in favour of the basic cupola; additions, however, in this case are higher and thereby send up the cost of the liquid iron by at least D.M. 1.43 per ton. Operational control of the basic cupola should be closer than in acid practice, especially as the slag needs constant supervision.

"Present Position of the 'Spraying' Process for Relining Cupolas"

By Dr. K. Kramer

The first results of experiments carried out to ascertain the durability of cupola patching as carried out by the "spraying" process as compared with monolithic patchings are now available. No particular difficulties have been encountered when using machines normally designed for ejecting concrete, when either dry or moist material is thrown. Mixtures made up with 20 to 25 per cent. clay, 25 to 50 per cent. of quartzite, and a quantity of "strong" sand have had their plasticity increased by a moisture content of about 5 per cent. controlled at this figure before filling the concrete ejector. Whilst it is possible to reduce by this means the creation of dust, the problem of giving the operators adequate vision and breathing protection has still to be solved. The solidity of repairs effected by ejected refractories is less than that of rammed material, as a rammed repair is only made after a certain amount of wear (in most cases after the melting of several charges) has brought about the danger that increasing diameter of the furnace gives a faulty proportion between the charge and the blast input. Here, the injection method shows advantages when it is used repeatedly for patching purposes. For cupolas badly worn through continuous service for several shifts, ramming gives a sounder job because of the heavy ramming, but the mending of the burnt-out area using heavily-moistened clay-containing materials, cannot equal the capacity for resistance given by the spray gun.

[The rest of the papers submitted were mainly of interest to German nationals only.—Editor.]

I.B.F. Foremen's Training Course

Applications should now be made to participate in the fifth foundrymen's training course, organized by the Institute of British Foundrymen with the aid of funds furnished by the Joint Iron Council, to be held at Ashorne Hill, Leamington Spa, Warwickshire, from Thursday, April 23, to Saturday, April 25. The provisional programme for the course was given on page 369 of the September 25 issue. Those wishing to attend the course should carefully note that accommodation at Ashorne Hill is definitely limited, and applications to attend the course will be dealt with strictly in the order of receipt. In past years, all vacancies have been taken and it has been necessary for some applicants to stay at hotels in Leamington, 4 miles away, therefore early application for vacancies is strongly recommended.

Accommodation at Ashorne Hill is only available on this occasion until Saturday evening, April 25, and those unable to return home on that day will have to stay overnight at a hotel. Forms of application to attend the course may be obtained from the secretary of the Institute, to whom they should be returned as soon as possible. It is again emphasized that while the closing date for the receipt of forms is February 10, 1953, it is anticipated that all vacancies will have been allocated some time before this date.

Students' Essay Competition, 1953

The Council of the Institute of Metals will present two prizes of twenty guineas each for the best essays submitted by students in accordance with regulations available on application to the Institute at 4, Grosvenor Gardens, London. S.W.1. Each prize will be in the form of ten guineas in money and ten guineas in scientific, technical or other appropriate types of books, to be selected by the prizewinner.

I.A.E.S.T.E.

The fifth annual Report of the International Association for the Exchange of Students for Technical Experience shows that good progress has been registered and the total of 3,493 appointments were effected during 1952. Practically everybody has toyed with the idea of sending their children abroad during the long summer vacation to gain experience, but just did not know how to implement the idea. However, if a boy is training at a recognized technical institute either here or abroad, a scheme will probably eventuate if one writes to Mr. J. Newby at the Imperial College of Science, South Kensington, London, S.W.7. Many foundries, both at home and abroad, support this scheme.

British Blast Furnaces in the September Quarter, 1952

These tables are published through the courtesy of the British Iron and Steel Federation.

Derbyshire, Leicestershire, Notts, Northants, and Essex.

Name of firm.	In blast at end of the third quarter, 1952.					Weekly average in blast.	Total existing at end of quarter.
	Hematite.	Basic.	Foundry and forge.	Ferro-alloys.	Total.		
Clay Cross	—	—	1	—	1	1	2
Ford Motor	—	—	1	—	1	1	1
Holwell Iron	—	—	3	—	3	3	4
Kettering Iron & Coal	—	1	1	—	2	2	2
New Cransley Iron & Steel	—	—	1	—	1	1	2
Renishaw Iron	—	—	1	—	1	1.8	2
Sheepbridge	—	—	1	—	1	1	1
Stanton Ironworks: Stanton-by-Dale	—	—	5	—	5	5	5
Staveley Iron & Chemical	—	—	4	—	4	4	4
Stewarts and Lloyds: Corby	—	4	—	—	4	4	4
Wellingboro' Iron	—	2	—	—	2	2	3
TOTAL	—	7	18	—	25	25.8	30

Lancashire (excl. N.-W. Coast), Denbighshire, Flintshire, and Cheshire.

Brymbo Steel	—	1	—	—	1	1	1
Darwen & Mostyn	—	—	—	1	1	1	1
Lancashire Steel Corp'n	—	2	—	—	2	2	4
TOTAL	—	3	—	1	4	4	6

North-West Coast.

Barrow Ironworks	2	—	—	—	2	2	3
Charcoal Iron	—	—	1	—	1	1	1
Millom & Askam	2	—	—	—	2	2	3
United Steel: Workington	2	—	—	1	3	3	3
TOTAL	6	—	1	1	8	8	10

Lincolnshire.

Appleby-Frodingham	—	7	—	—	7	7.9	8
Lysaght, J.: Scunthorpe	—	4	—	—	4	3.5	5
Thomas, R., & Baldwins: Redbourn	—	2	—	—	2	2	3
TOTAL	—	13	—	—	13	13.4	16

North-East Coast.

Cargo Fleet Iron	—	2	—	—	2	2	3
Consett Iron	1	2	—	—	3	3	3
Dorman, Long: Acklam	—	3	—	—	3	3	4
Redcar	—	2	—	—	2	2	2
Cleveland	—	2	—	—	2	2	4
Bessemer	—	3	—	—	3	3	3
South Bank	—	—	—	2	2	2	3
Gjers, Mills & Co.	2	—	—	—	2	2	5
Pease & Partners	2	—	—	—	2	2	3
Skinningrove Iron	—	2	—	—	2	2	3
South Durham Steel & Iron	—	2	—	—	2	2	3
TOTAL	5	18	—	2	25	25	36

Scotland.

Bairds & Scottish Steel: Gartsherrie	1	1	1	—	3	3	5
Carron	—	—	1	—	1	1	4
Colvilles	—	3	—	—	3	3	3
Dixon's	—	—	2	—	2	2	6
TOTAL	1	4	4	—	9	9	18

South Wales and Monmouthshire.

Briton Ferry Works	—	1	—	—	1	1	1
Guest Keen Baldwins: Cardiff	1	2	—	—	3	3	4
Thomas, R., & Baldwins: Ebbw Vale	—	2	—	—	2	2	2
Steel Company of Wales: Margam	—	3	—	—	3	3	3
TOTAL	1	8	—	—	9	9	10

U.K. October Trade

United Kingdom exports in October were provisionally valued at £218,500,000. The monthly average for the third quarter, which had 26 working days per month, was £191,300,000, although October had 27 working days, the figure recorded represents an increase of nearly 10 per cent. in the daily rate of export.

Imports into the United Kingdom were valued at £266,900,000, compared with £262,600,000 per month in the third quarter.

With re-exports at £12,100,000, the excess of imports (c.i.f.) over exports and re-exports (f.o.b.) was £36,300,000, compared with £61,100,000 per month in the third quarter, and an average for the first nine months of £72,600,000.

United Kingdom exports to North America in October increased to a provisional total of £28,600,000, compared with £23,200,000 per month in the third quarter and £21,000,000 in the first half-year. In the first 10 months of this year United Kingdom exports to North America averaged £22,400,000 per month, compared with £23,600,000 in the same period of 1951.

Exports to both the United States and Canada shared in last month's increase. Shipments to the United States were £14,400,000, compared £11,400,000 per month in the third quarter and £11,800,000 in the first half-year, while to Canada they were £14,200,000, compared with £11,800,000 in the third quarter and £9,200,000 in the first half-year.

Broken Hill's Iron-ore Lease

In his explanation of the Bill to ratify the agreement between the State Government and Broken Hill Proprietary in the Legislature Assembly recently, the Minister for Industrial Development, Mr. Arthur Watts, said that the proposed legislation gave Broken Hill Proprietary a 50-year lease on iron-ore deposits at Koolan Island, with the right of renewal for periods of 21 years.

This island is one of the State's largest ore deposits. Broken Hill Proprietary will spend £4,000,000 in Western Australia, near the Anglo-Iranian Oil Company's refinery at Kwinana, in erecting a rolling mill, factory, and wharves. The rolling mill will have a capacity of 50,000 tons annually. No export of iron ore outside Australia is permitted. Ultimately Broken Hill Proprietary will establish an integrated iron and steel industry in Western Australia.

British Blast Furnaces in the September Quarter, 1952—*continued*

Staffordshire, Shropshire, Worcestershire, and Warwickshire.

Name of firm.	In blast at end of the third quarter, 1952.					Weekly average in blast.	Total existing at end of quarter.
	Hematite.	Basic.	Foundry and forge.	Ferro-alloys.	Total.		
Goldendale Iron	—	—	1	—	1	1	2
Lilleshall	—	—	1	—	1	1	2
Round Oak Steel Works	—	—	1	—	1	1	2
Shelton Iron, Steel & Coal	—	3	—	—	3	3	3
Stewarts and Lloyds: Bilston	—	2	—	—	2	2	3
TOTAL	—	5	3	—	8	8	12
Sheffield.							
Park Gate Iron & Steel	—	2	—	—	2	2	2
GRAND TOTAL	13	60	26	4	103	104.2	140

Weekly Average Number of Furnaces in Blast during the September Quarter, 1952, and the Previous Four Quarters

District.	1951.		1952.		
	Sept.	Dec.	March.	June.	Sept.
Derby, Leics., Notts., Northants, and Essex	24.2	24.4	24.5	23.6	25.8
Lancs. (excl. N.-W. Coast), Denbigh, Flint, and Ches.	4	4	4	4	4
Lincolnshire	13.7	13.7	13.1	12.8	13.4
North-East Coast	23	24	24	24.3	25
Scotland	9	9	9	9	9
Staffs., Shrops., Worcs., and Warwicks.	8.9	8.5	8.4	8.7	8
S. Wales and Monmouth	7.5	7.7	7.8	8	9
Sheffield	2	2	2	2	2
North-West Coast	7	8	8	8	8
TOTAL	99.3	101.3	100.8	100.4	104.2

The following companies have furnaces in course of construction or rebuilding:—Barrow Ironworks; Darwen & Mostyn Iron; R. Thomas & Baldwins (Ebbw Vale); Sheepbridge; John Summers; Appleby Frodingham Steel Co. (2).

European Foundrymen meet in Rapallo

The foundry meeting, organized in Rapallo by *Assofond* and the Foundry Centre of the Italian Association of Metallurgy, has been characterized by its practical nature; the Papers read by well-known technicians were reinforced by several visits to large metallurgical plants, in order to give a proper picture of the development attained by this branch of Italian industry. More than three hundred delegates, including a number from the United Kingdom, Sweden and Switzerland, participated.

The meeting was opened on October 3 by the president of *Assofond*, Mr. Lodigiani, who, in his introductory remarks, dealt with problems such as the export duties on pig-iron, which he thought were excessively high.

Amongst the subjects discussed were the work of the Finsider Metallurgical Institute; foundry accident prevention; a report of the visit of a productivity team to America; and foundry costing. In the Excelsior Palace, an exhibition of castings was staged largely by *Camfond*. The works visited included the non-ferrous foundries of Ansaldo; the Integral Cycle Company; and the Cornigliano Steelworks.

Forty Years Ago

In our issue for November, 1912, the Editor used his Notes and Comments article for a long abstract of an address on education by a Scottish iron-master; it was a perfect example of mediæval thinking and should never have been printed. Apparently, electro-magnets were well-developed, for there was a picture of the lifting of a 6-ton 12-cwt. roll. Articles on welding were beginning to appear rather more and more frequently and in this issue there were two, one dealing with copper and aluminium and the second of a general character. There was a report of an engineering exhibition at Olympia, but it is not clear whether or not there was a definite foundry section; however Wadkins; Bonvillain and Ronceray; Britannia Foundry Company and the Adjustable Moulding Machine Company (a joint exhibit); Alfred Gutmann; the Königliche Würtemburg Hüttenwerke; James Keith and Blackman; and Alldays and Onions exhibits were described. The establishment of an electric steelworks at Dunster-on-Tyne was announced.

ABOUT 9,000 PEOPLE visited the productivity exhibition held at Newcastle-upon-Tyne from October 30 to November 6.

British Cast Iron Research Association

Annual Meeting

Chairman's Report

Presenting the report and accounts at the annual general meeting of the British Cast Iron Research Association held last week in the Waldorf Hotel, London, the chairman, Dr. J. E. Hurst, said work had reached a point at which finance again appeared as a limiting factor. Inflationary conditions had been a big factor in that, for it was estimated that to-day one had to spend a pound for what 9s. would have purchased in 1938, or 16s. 5d. in 1948. Where capital expenditure was concerned, a pound was required to-day for what could have been obtained in 1938 for 6s. 6d., or in 1948 for 12s. The Council would shortly therefore have to consider application to the Department of Scientific and Industrial Research for a new grant arrangement.

In selecting items for special mention from the Report, Dr. Hurst included the elegant demonstration by the research manager of the Association of the precise nature and amount of trace elements likely to occur in British pig-irons interfering with the production of a perfectly nodulized cast iron by the magnesium process and, furthermore, that those difficulties could be overcome by the accompanying use of a small amount of cerium. Other members of the research staff had been able to evolve methods by which those small amounts of subversive elements could be determined. The report on the analysis of foundry slags by means of the spectrograph was equally remarkable, for it brought with it the possibility of a complete slag analysis within a period of two hours. The work on the fluidity of cast iron and on moulding sands had also been outstanding, and he also mentioned the high degree of promise shown by Mr. White's design for a ventilating system to be attached to ordinary pedestal or stand grinders used for fettling.

The proposition that the Report be adopted was seconded by Mr. S. H. Russell, who said the industry had to some extent imposed on the Cast Iron Research Association the very practical research work being done on foundry atmospheres and the work being done by the operational research team. When they were originally visualized, it was thought they could quite readily be carried by the increased income of the Association, but now there was a sort of " pull Devil, pull Baker " as to how far they could go on with the practical work and how far the fundamental research team could go.

The Report was then adopted.

New President

The chairman announced that the next item on the agenda imposed on him a very pleasant task —it was the proposition that Mr. F. Scopes be elected president for the forthcoming term. Mr. Scopes needed no introduction to the members of the Association, or in fact to anyone in the industry. As well as being president of the Joint Iron Council and chairman of the Council of Iron Producers, Mr. Scopes was managing director of the Stanton Iron Works, the largest foundry organization in Great Britain and, possibly, in the world.

Mr. J. J. Sheehan seconded the proposition, which was unanimously carried.

Dr. Hurst then welcomed Mr. Scopes to the Chair to preside over the meeting.

Acknowledging his election, Mr. Scopes thanked Dr. Hurst and Mr. Sheehan for the very kind things they had said about him. He hoped members were not putting their hopes too high, but he would do his best for the Association during his term of office. He had not had the advantage of having graduated through membership of the various working committees of the Association like most of his immediate predecessors, but he would try and make up for that lack of technical knowledge and experience in other ways.

He then proposed that the best thanks of the meeting be given to the retiring president, Dr. Hurst, whose services were well known to all. By way of rather more than formal recognition of the appreciation, he moved that Dr. Hurst be elected an honorary member of the Association.

Mr. P. H. Wilson, who seconded, congratulated the new president on his appointment, and warmly supported the proposition concerning Dr. Hurst, which was subsequently endorsed by the meeting.

As *vice-presidents* of the Association Mr. C. Gresty was then re-elected, Mr. J. Arnott, Dr. C. J. Dadswell (president, Institute of British Foundrymen) and Mr. N. P. Newman were elected. Thanks were accorded to Mr. T. M. Herbert, Mr. T. McKenna, Mr. A. E. Pearce, Mr. W. Rennie, Mr. S. H. Russell and Mr. J. J. Sheehan, vice-presidents who retired. The re-election of Mr. E. P. Major as *hon. treasurer* and the retiring members of Council *en bloc*, then took place, along with reappointment of the auditors. At the same time Dr. L. B. Pfeil, co-opted during the year, was elected to the Council.

Vote of Thanks

Mr. F. Arnold Wilson, proposing a vote of thanks to the Council and committees said they had done a grand job of work and it gave him the greatest pleasure to propose that the warmest thanks of the meeting be accorded to them for their efforts.

Mr. V. C. Faulkner seconding, did so quite formally, and the motion when put to the vote was carried unanimously.

The Chairman, acknowledging, expressed regret that the annual general meeting was not more largely attended by the general body of the members. The Council could take it as an implicit vote of confidence that members generally did not turn up in greater numbers, but at the same time they would be very welcome to initiate more discussion and questions.

The meeting closed on a proposition of a vote of thanks to the chairman and to the director and staff of the Association.

Notes from the Branches

Lancashire

The Lancashire branch of the Institute of British Foundrymen held their opening meeting on October 4, at the Engineers' Club, Manchester. The president, Mr. R. Yeoman, in opening the meeting, offered a special welcome to the president of the Institute, Dr. C. J. Dadswell; he also presented a water-colour painting of a scene in the Lake District to Mr. Tom Makemson. This was presented as a token of respect on behalf of the Lancashire branch for his 25 years' service as secretary to the Institute. The president then gave his address, in the course of which he said:—

New Members

"In my report as secretary of the branch last year I referred to the number of new members being enrolled. I propose, therefore, to talk about "The Institute, the Lancashire Branch, and You," and if my remarks are addressed mainly to our newer members, I trust they will be of interest to the older ones. About 28 years ago a youth walked into a classroom C3 at the College of Technology to attend his first meeting of the Lancashire branch of the Institute of British Foundrymen as an associate. He had been recruited as a result of the propaganda work of the late Mr. S. G. Smith, a past-president of the branch, one of whose foundry classes he had attended.

"In attending his first meeting of the Lancashire branch, he did so with some diffidence, a feeling of having got somewhere and some pride in belonging to something. A quarter of a century later, in spite of the cynicism of others, bad working conditions, and laborious work, he still thought that progress could be made and satisfaction achieved.

"We join this Institute for many reasons. The man who joins it for what it will *give* quickly becomes disillusioned. The Institute does not pretend to give any prospective member anything, but it does offer in its ranks benefits of extreme value from participation in its activities.

"Although I have attended meetings of other branches and sections regularly, my thoughts have always been with the Lancashire branch, and I think, even after making allowances for the growth of the industry in new areas, that some of the glory has departed from this branch. It has been the premier branch, and still occupies a prominent position, but I think a little more drive would improve our position. Your prompt and regular attention at branch events ensures a successful branch, your attention to the businesses of the branch at annual meetings promotes efficiency.

"Without any reflection on my predecessors I would say that each member coming to office as president ought to be well acquainted with the organization, and have prepared lines of action and a definite programme backed up by a wide experience in the industry, otherwise the branch must inevitably suffer. Too much onus has for years been placed upon the secretary. This branch is a big organization and is beyond the efforts of one man to bear the main responsibility of organization. Recently we have attempted to split the work amongst more members, which I think will ensure consistent efficiency. I suggest that a further innovation worthy of contemplation would be the formation of a small 'policy executive committee' empowered to arrange the year's programmes well ahead and give attention to promoting the affairs of the branch still further. The Institute is your Institute and every eligible person should be a member; it holds a prominent position in the industrial world and one that I think will grow in importance."

The president's address was followed by a Paper presented by Mr. J. Richardson, of the Brightside Engineering Company, Limited, Sheffield, and Mr. C. F. Lawson, of Buckley & Taylor, Limited, Oldham, entitled "Methods Employed in the Production of Heavy Iron Castings." After the lecture, dinner was held at the Engineers' Club, followed by a visit to a theatre.

Sheffield

At the opening meeting of the Sheffield and district branch of the Institute of British Foundrymen, held on October 6, Mr. W. J. Colton, the retiring president, took the chair, and introduced the new president, Mr. F. A. Martin, who then gave his presidential address entitled "Men and Moulds."

Men and Moulds

"There was once a time when every man, as he earned his bread, knew what he was doing. At the end of the day he could look at his work, assess its value or its quality, and so assess himself. If he had fallen short of his standard, the record was there to spur him to better work tomorrow. He needed no foreman to tell him, no body of inspectors and analysers and testers to point out when things were wrong.

"The relentless inventiveness of man's mind, however, added to his natural vanity, ambition and acquisitiveness, put into his hands power and machines of increasing complexity, and the principle of specialization. There remained enough variety and interest in each domain to satisfy all the talent, knowledge, skill, and understanding that could be brought to bear on it. But during the last century and a half, with a fierce acceleration in the last three or four decades, the operation of the productive processes by whose means civilization creaks on its undignified way have tended to be broken down into smaller and shorter stages. That is called "work-simplification." It is not only in the field of manufacturing industry that the change has taken place.

Elimination of Skill in Industry

"In our foundries we are perhaps more fortunate than many other industries, in that the skill of the foundryman is still exercised with a large measure of understanding on floor level. But the current is bearing us steadily away from craftsmanship. Seldom is a moulder enabled to see the finished casting in his hands, after he has moulded, melted, cast and fettled it. His craft is still preserved in the operations of hand-moulding, yet that field is farther invaded every day. Standard designs make way for the moulding machine to take toll of craftsmanship, and I even heard, the other day, from an American visitor, of a moulding machine installation which is to produce 300 moulds per hour on a push-button-controlled cycle.

"Now, we know that as skilled tasks are taken over by machines, there must be still more highly-skilled men controlling the use of the machines, matching their production rates all along the line, watchful to detect faults in the product before wasteful errors are multiplied and reduplicated in ruinous profusion. Since complicated mechanisms, fed by the sweat of men's brains, beget mechanisms even more complex, there are ever fresh pinnacles of achievement to be scaled by the keenest minds in the industry. At the common level, skill is being eliminated. The sand which the moulder once mixed, tempered and adjusted to his need or fancy, is milled under the control of a specialist; heading and gating are determined for him by a methods engineer, the matching of his cope and

Notes from the Branches—Sheffield

drag is secured by mechanical devices, and the hardness of his mould predetermined according to a fixed number of jolts or strength of squeeze. The skill still exists, but it has been divided among a host of technologists, each in turn circumscribed by the limits of his specialized responsibility.

"The loss of exercise of his full skill takes from the moulder the pleasure it gave, and I am sure that the specialists among whom that skill has been redistributed do not gain for themselves as much as has been lost by the moulders whose thinking they are doing for them. Neither should managers and directors of foundries imagine that the process will for ever leave them untouched. Control by the State, through its servants, bears all the signs of being the logical outcome of specialization and promises, in the course of a few more generations, to impose ant-hill philosophy from bottom to top of industry—unless a great many of us see clearly the dangers of our present trend and take steps to counter them.

"I have tried to show you what these dangers are. They are being made the greater by the methods now being used to counteract them. 'Work is not interesting,' goes the saying, 'so let us work as short a time as possible and spend the rest of our waking hours in enjoyment.' There is undoubtedly a fair core of people who, seeking fulfilment of their natural selves outside of working hours, find it in creative occupations, in exercising a craftsmanship which they are denied at work, in mental culture or some form of public service. For the majority, however, it must be admitted that 'enjoyment' means entertainment, and entertainment when carefully examined turns out to be a process which deludes the mind into believing that it is occupied, and so successfully obviates the need for thought.

Conclusion

"If our civilization is to be saved from the same devaluation of work as destroyed Rome, we have a job to do in our own industry to maintain and restore interest and pleasure in this fascinating job of producing castings. Is it to be supposed that a man on a repetitive job will do it less well if he knows why he does it, what he is making, where it goes and the difficulties that attend its manufacture? The reply I may get to that question is that such a man evinces no interest. That is just the trouble: the rot has already set in. It can only be put right by a steady continuing effort to re-educate our people to an appreciation of the values they are losing. I suggest that education within industry, is one of the most important ancillary services to the production effort.

"You will observe that, in this year's programme, the members of the Sheffield branch are offered a minimum of specialized papers for consideration. On the other hand, there will be ample opportunities to put forward contending opinions, and comment, within the rules of debate, will be unrestricted. I trust that this winter the fare offered you by your Committee will be such as to add to your pride and pleasure in the exercise of your craft as foundrymen, and will provide entertainment which does not obviate thought."

Presentation of Diplomas

Mr. Martin then welcomed Dr. C. J. Dadswell, the president of the Institute, who presented the Institute's Diploma to Mr. E. J. Brown for his Paper entitled "Castings to Resist Abrasive Wear." Mr. E. J. Brown suitably replied. The films "The Brass Trail" and "Modern Materials Handling" were then shown to an appreciative audience of about 90 members.

Publications Received

Statutory List of Companies. Published by the Iron and Steel Corporation of Great Britain, 1, Chester Street, London, S.W.1. Price 1s. 6d. net.

In this list there appear no fewer than 302 names of firms coming within the ambit of the Corporation. These form the nationalized omelette which has to be unscrambled. The list is divided into main companies and their subsidiaries, with still further subdivisions.

Oxygen in Steelmaking.—The British Oxygen Company, Limited, Bridgewater House, Cleveland Row, St. James's, London, S.W.1, have issued a brochure in the above series sub-titled "The Electric Arc Furnace." In it useful information is given as to the acid and basic furnaces making plain carbon steels and for those of high chromium content. Data are given detailing the oxygen requirements in varying circumstances. Steelfounders will be interested in reading this pamphlet.

Recruitment and Training of Senior Staff. Issued by the United Steel Companies Limited, 17, Westbourne Road, Sheffield, 10.

This very well-illustrated 24-page booklet, tells, in logical sequence, the system which is in operation within this group to ensure for the entrant a proper training in order that he can qualify for the higher posts in its managerial services. It is available to our readers on writing to Sheffield, addressing the Chief Educational Officer. There are a number of foundries within this organization.

Brief Subject and Author Index of Papers in the Proceedings 1937-1951. Issued by the Institution of Mechanical Engineers, Storey's Gate, St. James's Park, London, S.W.1.

When reviewing an earlier edition of this nature going back to 1847, comment was made on the absence of papers on foundry practice, after a spate in the earliest years. This condition is shown to have been corrected in the issue under review, and now at reasonable intervals some aspect of foundry practice is dealt with. It is a really useful publication for those requiring a quick and reliable source of information on mechanical engineering subjects.

Drivers' Handbook for all C Licence Holders. Published by Traders' Road Transport Association, Limited, 146, New Bond Street, London, W.1. Price 1s.

This 36-page booklet, of a suitable size for carrying in the pocket, is an extremely desirable publication for presenting to every driver in one's employ. It contains all the information, which is of no small mass, needed to be absorbed by the commercial-vehicle driver if he is to remain trouble-free in the widest possible interpretation. The reviewer urges all foundry owners possessing road transport goods vehicles to expend the modest cost of this booklet for their own and the communities welfare.

Accidents—How they happen and how to prevent them.—Vol. 12. July, 1952. Published for the Factory Department, Ministry of Labour & National Service by H.M. Stationery Office. Price 9d. net.

Apart from the illustrations, which are frightful, this quarterly publication does serve a very useful purpose, in the prevention of industrial accidents. Of interest to our readers is the sensible recommendation that drop-bottom cupolas should be dropped by pulling, by means of a longish chain, a supporting prop under the two halves of the closure. The case reported, where men were close by when the bottom dropped, resulted in four men receiving bad burns. Other accidents detailed may occur in foundries and are worth study.

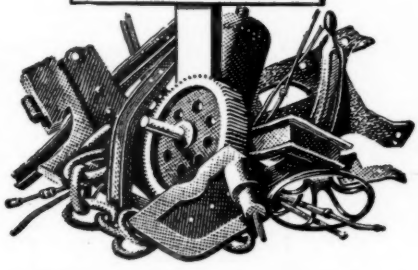
New Patents

The following list of patent specifications accepted has been taken from the "Official Journal (Patents)." The numbers given are those under which the Specifications will be printed and all subsequent proceedings will be taken. Applications for copies of the full Specifications (2s. 8d. each, post free) should be made to the Patent Office, 25, Southampton Buildings, Chancery Lane, London, W.C.2.

681,247 Soc. Rateau. Refractory steels or alloys resisting high temperatures, chiefly for gas turbines.
681,337 Thies, A. Rainwater pipe manufacture.
681,343 Smith, N. E. Arched furnace roofs and bricks therefor.
681,353 Gerber, J. S. Apparatus for indicating or controlling the level of molten metal in a container.
681,368 Polygram Casting Company, Limited. Moulding mixtures for making metal-casting moulds and cores.
681,552 Dayton Malleable Iron Company. Producing cast iron.
681,589 Electric Furnace Products Company, Limited. Production of low-carbon alloys.
681,609 British Iron and Steel Research Association. Methods of cleaning gases.
681,614 Birlec, Limited, and Hancock, P. F. Generators of protective gaseous furnace atmosphere.
681,629 Compagnie de Produits Chimiques et Electrometallurgiques Alais, Froges, et Camargue. Electrolytic refining of aluminium.
681,665 Felten & Guilleaume Carlswerk Akt.-Ges. Extruding press for the pressing of metal tubes from ingots.
681,756 Oesterreichisch-Amerikanische Magnesit Akt.-Ges. Rotary tube furnaces.
681,769 Metallges. Akt.-Ges. Sintering process.
681,833 Harrison & Sons (Brass Founders), Limited, R. C., and Harrison, E. R. Moulder's rammer.
681,876 Deutsche Edelstahlwerke Akt.-Ges. Process for utilizing alloy steel scrap to form steel bodies.
681,887 Goodyear Aircraft Corporation. Method of making metal moulds.
681,995 Poumay, A. Cupolas for foundries and steelworks.
682,020 Matthews, E. F. (Beers, G. H.). Treating chrome ore.
682,070 Fronhoff, J., and Grimberg, H. Control mechanism for motor-driven conveyor belts.
682,079 General Electric Company, Limited, and Sowter, A. B. Cold-pressure welding of metal.
682,114 Westfalische Draktindustrie. Annealing wire, strip metal, etc.
682,135 B.E.V.I. Bulloneria e Viteria Italiana Soc. R.L. Drawing of wire or rod.
682,176 National Smelting Company, Limited, and Derham, L. J. Blast furnaces and grateshaft furnaces for smelting zinc ores.
682,226 United States Pipe & Foundry Company. Making tubular metal castings.
682,236 Fitzpatrick, H. J. (Rajjura, N.). Electric furnaces.
682,296 Huttenwerke Ruhrort-Meiderich Akt.-Ges. Production of ferro-manganese in blast furnaces.
682,305 Evans, W. A., and Evans, D. W. Moulding cores.
682,311 Clyde Alloy Steel Company, Limited, and Nicol, J. Moulding of metal ingots.
682,316 Erim. Producing cast iron.
682,414 Huettenweik Rheinhausen Akt.-Ges. Treatment of blast-furnace slag.
682,678 National Lead Company. Ferrous alloys.

WHAT EVERY MANAGEMENT SHOULD KNOW ABOUT

scrap



What is scrap? Obsolete plant and machines, old spares, redundant buildings — anything made from iron and steel for which you have no foreseeable use.

What good is it to me? No good at all in its present state. But send it back to the steelworks and it can go to make the new steel that you and all steel-users need. Remember — a ton of scrap may make a ton of new steel.

Can't they make steel without scrap? Yes—but not enough steel. Last year, 58% of our steel was made from scrap. The more scrap we use the more coal, coke and iron ore we save for other important purposes.

What shou'd I do with my scrap? See your local scrap merchant. He will be glad to help with dismantling and collection. If you have any trouble disposing of iron and steel scrap, write to the British Iron & Steel Federation for the address of your Joint District Scrap Committee.

What shall I get for it? You will be paid a fair price for your scrap. MORE IMPORTANT — you will be doing yourself and all steel-using firms a great service by helping to increase steel production.

SPEED THE SCRAP
SPEED THE STEEL

Issued for the STEEL SCRAP DRIVE, by the British Iron and Steel Federation and the National Federation of Scrap Iron, Steel and Metal Merchants

T.28

Record October Steel Output

Steel output last month was at an annual rate of 17,044.000 tons, the highest recorded for the month of October. In the previous month output was at an annual rate of 17,149,000 tons, while in October, 1951, production was at an annual rate of 15,629,000 tons. Pig-iron production was also a record for the month, the annual rate being 10,616,000 tons, compared with 10,845,000 tons in September and 9,865,000 tons in October of last year.

These records were achieved despite the loss of production caused by the strike of bricklayers at the works of the Steel Company of Wales, Limited.

The British Iron and Steel Federation states that output is benefiting increasingly from the new plant and extensions resulting from the industry's first post-war development plan embarked on in 1946.

Latest steel and pig-iron output figures (in tons) compare as follows with earlier returns:—

	Pig-iron.		Steel ingots and castings.	
	Weekly average.	Annual rate.	Weekly average.	Annual rate.
1952—September ..	208,600	10,845,000	329,800	17,149,000
October ..	204,200	10,616,000	327,800	17,044,000
1st ten months	201,600	10,482,000	306,100	15,917,000
1951—September ..	189,500	9,854,000	302,900	15,749,000
October ..	189,700	9,865,000	300,600	15,629,000
1st ten months	183,900	9,565,000	300,500	15,628,000

Iron and Steel Output in France and the Saar

Production of pig-iron in France amounted to 826,000 metric tons in September, against 767,000 metric tons in August. Saar pig-iron output was 211,000 tons, compared with 212,000 tons in the previous month. Crude steel output in France totalled 933,000 tons, against 784,000 tons in August. Saar production of crude steel was 239,000 tons, compared with 235,000 tons in the previous month.

French output of rolled steel products amounted to 679,000 tons in September, against 504,000 tons in the previous month. Saar rolled products output was 171,000 tons, compared with 157,000 tons in August.

West German Steel Output Record

Western Germany achieved a new post-war record in crude steel production in October, when 1,462,000 metric tons were produced, compared with 1,378,000 metric tons in September. This represents an annual rate of 17,500,000 tons. Average production per working day was 52,228 tons, against 52,009 tons in September.

Western Germany's production of pig-iron in October was 1,167,000 tons, against 1,119,000 tons in September. Average production per working day was 37,646 tons, compared with the 37,292-ton average in the previous month.

Change of Address.—From November 17 the head office of Midland Silicones, Limited, has been changed to 19, Upper Brook Street, London, W.1. Tel.: GROsvenor 4551; 'grams.: Midsil Phone, London. The card announcing this change carries a useful map and picture to help visitors in locating the new premises.

Scrap Drive Progress

Search for Home Metal to be Intensified

No relaxation is envisaged in the drive for scrap metal from home sources. In fact, the drive, which has been pursued for nearly two years, will it is hoped, be intensified as the result of an appeal by the British Iron and Steel Federation, working in collaboration with the National Federation of Scrap Iron, Steel and Metal Merchants, to all concerned to redouble their efforts to turn out every piece of obsolete and redundant iron and steel.

Scrap imports during 1952 are at about the same level as last year and, in view of the increased home requirements of German works, there appears to be no possibility in the early future of obtaining additional supplies from overseas.

Steelmakers' Receipts

During 1952 steelmakers' receipts of scrap from home sources (other than shipbreaking) have exceeded the 1951 deliveries by more than 300,000 tons per annum, mainly due to the scrap drive and the effect of an increase in prices, which operated from August, 1951.

In 1950, when steel production totalled 16,293,000 tons, the quantity of scrap consumed in the furnace was 10,254,000 tons, or 63 per cent. Last year's steel output was 15,638,000 tons, 9,128,000 tons (58.4 per cent.) of scrap being consumed. The annual rate of steel production in 1952, based on the 42 weeks ended October 18, was 15,838,000 tons, scrap consumption being 8,800,000 tons, a percentage of 55.5. The increasing supplies of pig-iron now reaching steelmakers are, of course, the reason for the lower scrap consumption.

Several appeals have been made to all users of steel to scrap obsolete plant and equipment. As a result of a special drive within the steelworks themselves, 325,000 tons of additional scrap was obtained in 1951, and receipts from this source during the current year have been at an annual rate of about 275,000 tons.

Direct contact has been established with all local authorities with the object of stimulating the collection of old tins and other ferrous scrap from household refuse, and although there is a lack of uniformity in the response, progress is being made. Special drives for household scrap have been held in more than 50 towns, with the co-operation of the local salvage organizations, covering about 7,500,000 of the population, resulting in the collection of about 10.000 tons of scrap. These drives are being extended to cover the whole country.

Farmers' Poor Response

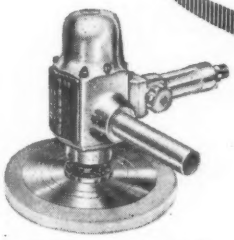
A direct appeal by prepaid postcards to over 200.000 farmers is meeting with only a very moderate response. Arrangements have been made for the collection of farm scrap by scrap merchants on the general basis of £3 per ton at the farm. Arrangements have been made with many local authorities to uplift disused tram track. Some 50.000 tons will probably be obtained over the next 12 to 18 months. Each of the Service departments has issued instructions to its establishments at home and abroad, directing them to accelerate the disposal of scrap.

Change of Address.—The National Brassfoundry Association announce that on and from Tuesday, November 25, the address of their premises will be 4, Calthorpe Road, Five Ways, Edgbaston, Birmingham, 15. Tel.: EDGbaston 2177-2178. Mr. Edgar N. Hiley is the secretary.

"THESE HOLMAN *Interchangeable* MOTORS KEEP THINGS MOVING"

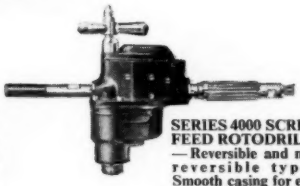
Completely self-contained, *interchangeable* motors make Holman Rotodrills and Rotogrinds exceptionally convenient and efficient in operation as well as unusually low in maintenance costs. Their power-weight ratio is appreciably higher than any other tools of equal capacity, and every tool in the range is a smooth-running well-balanced machine with all the dependability associated with Holman Pneumatic Tools.

This self-contained power unit fits perfectly into every tool in the range, and is readily removed intact. Its cylinder walls are of hard chrome plate.



SERIES 41 ROTOSANDERS— Surface grinders and sanders ideal for large area work. Same interchangeable motor as in Series 4000 Rotodrills. Thumb-type throttle gives perfect control.

SERIES 40 ROTOGRINDS — Useful range of general-purpose grinders, surface grinders, loco rod and extension grinders. Various speeds for all classes of work. Straight or grip handles supplied. Features similar to Series 4000 Rotodrills.



SERIES 4000 SCREW FEED ROTODRILLS — Reversible and non-reversible types. Smooth casing for easy handling. Automatic safety device and lubrication. Instantaneous reversing — wide gearing range. All usual capacities available.

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SUBSIDIARY COMPANIES, BRANCHES AND AGENCIES THROUGHOUT THE WORLD. HC10

Personal

MR. MAX DAVIES, public relations officer of the British Iron and Steel Research Association, has been elected to the Council of the Newcomen Society.

REDPATH, BROWN & COMPANY, LIMITED, structural engineers, of Edinburgh, have announced that MR. H. ALTON and MR. W. MOORE have been appointed directors.

MR. A. J. C. MACLEOD export manager of Lancashire Dynamo & Crypto, Limited, left on Monday for an extensive business tour of Pakistan, India, Ceylon, and Cyprus.

SIR EDGAR SYLVESTER, who was chairman of the Gas Council from 1948 to 1951 has joined the board and has been elected chairman of the Sierra Leone Development Company, Limited.

MR. L. RUMLEY, sales director of Conveyancer Fork Trucks Limited, Warrington, left this country on November 15 for a tour of the African Continent which will include visits to Kenya, the Rhodesias and the Union of South Africa.

MR. A. BREWITT, of Newton, Chambers & Company, Limited. described some personal experiences in connection with the practical aspect of welding on site erections throughout the country in a Paper to the South London branch of the Institute of Welding on November 13.

MR. H. L. BOWEN, a technical executive of the valve division of Mullard, Limited, London, W.C.2, has recently completed 25 years' service with the company. To mark the occasion a luncheon was held recently, when an inscribed gold watch and a cheque were presented to Mr. Bowen.

MR. EDWIN GRAHAM has been appointed general manager of the West Hartlepool shipyard of William Gray & Company, Limited, in succession to MR. JAMES LENAGHAN, who has resigned to take up the post of shipbuilding director of the Fairfield Shipbuilding & Engineering Company, Limited, Glasgow.

SIR DONALD SKIFFINGTON, who has, throughout his working life, been associated with the shipbuilding firm of John Brown & Company, Limited, has now relinquished his appointment, as director of the local and main boards of the world-famous Clydebank company, thus ending an active association which has extended for more than half a century. Following Sir Donald's resignation MR. J. W. BECK, secretary of the company, has been appointed to serve on the board.

To honour MR. JAMES SMITH, B.SC., representatives of engineering firms, including Mr. D. M. Semple, of Mirrlees Watson Company, Limited, and Mr. W. D. Lorimer, of the North British Locomotive Company, Limited, will foregather with educationists, such as Mr. James Ferguson, H.M. Inspector, and Mr. W. L. Robertson, deputy-director of Dumbartonshire, in Glasgow on November 24. This will be in recognition of Mr. Smith's service over 25 yrs. as secretary and organizer of evening and day-release classes in science and technology in the West of Scotland.

SIR ARTHUR SMOUT has received the City and Guilds Insignia Award in technology for non-ferrous metallurgy. He is a director of Imperial Chemical Industries, Limited, Murex, Limited, Murex Welding Processes, Limited, and Pyrotenax, Limited. Sir Arthur has served as president of the Institute of Metals, and vice-president of the Institution of Mining and Metallurgy. He is a life member of the council of Birmingham University, and for three years during the war was Director-General of Ammunition Production. The recipient of an insignia award for ferrous metallurgy was MR. ALBERT JACKSON, deputy general works manager of the Appleby-Frodingham Steel Company (branch of the United Steel Companies, Limited). Graduating at Sheffield in 1925, Mr. Jackson was awarded the City and Guilds of London Institute Full Technological Certificate (Iron and Steel Manufacture) in that year. From 1929 to 1936 he was part-time lecturer in metallurgy at Scunthorpe Evening Technical School. He serves as a member of the Metallurgical Advisory Committee of the City and Guilds of London Institute, and in 1942 was awarded the Iron and Steel Institute's Williams Prize.

Obituary

MR. JONATHAN BRIDGE, chairman of David Bridge & Company, Limited, engineers, millwrights, etc., of Rochdale (Lancs), died last week.

THE DEATH is announced of MR. JOHN STUART DANIELS, chairman of T. H. & J. Daniels, Limited, Stroud, on November 13. He had served the company for 63 years. He was a member of the Institute of British Foundrymen. He was also a member of the Institute of Mechanical Engineers and served as president of its Western branch, and had similar connections with the Institution of Production Engineers.

MR. GEOFFREY M. GULLICK, a director of Mavor & Coulson, Limited, who died last week in Sheffield, at the age of 63, had been active in the development of coal-mining methods since 1907.

MR. JAMES W. HARRISON, managing director of Darlington & Simpson Rolling Mills, Limited, died recently at the age of 64. Due to retire shortly, he had been connected with the company for 42 years.

MR. WILLIAM JOSEPH PAULIN, a director of Donkin & Company, Limited, steering gear manufacturers, etc., of Newcastle-upon-Tyne, and a former managing director of the company, has died at the age of 82. He started with the firm as an apprentice in 1888, becoming works manager in 1919.

MR. A. P. WOOD, founder and first managing director of the Lancashire Dynamo & Motor Company, Limited, the forerunner of Lancashire Dynamo & Crypto, Limited, died on November 7. He was 80. It was in 1899 that Mr. Wood realized that the development of industry in the Trafford Park area, coupled with the transition from steam to electric power, would produce a great demand for electric motors. With local financial backing he formed what was undoubtedly one of the earliest companies devoted to the manufacture of this type of equipment.

THE DEATH is announced of MR. ALFRED BONNIE BILL, at the age of 40. A well-known metallurgist, he was found dead from cyanide poisoning in the laboratory of a Tividale factory. It was stated at an inquest at Old Hill, on November 11, that he forced a window to get into the factory. The Coroner recorded a verdict that Mr. Bill committed suicide while the balance of mind was disturbed. Mr. Bill had been foundry manager at Idoson Motor Cylinder Company, Limited, Tividale. The managing director, Mr. T. H. Taft, said that apart from a disagreement on policy, because of which Mr. Bill left on October 26, his conduct had been satisfactory. Mr. Bill was a prominent member of the Institute of British Foundrymen which he joined in 1935, when on the staff of Ley's Malleable Castings Company, Limited. Later he went to South Africa to take up a position with South African Malleable Foundries. A few years ago he was president of the South African branch.

CUT YOUR KINDLING COSTS BY 2/3RDS

★ 6ft. flame takes only 10 minutes to kindle cupolas

'Handyman'

PORTABLE PRESSURE BURNER

Already used by leading foundries throughout the country, the 'Handyman' will save up to £50 per annum per medium size cupola on wood alone.

- Lights a cupola on a shillingsworth of fuel.
- Skin dries moulds and cores.
- Dries ladles, shanks and cupola spouts.
- Can also be used for spray-painting equipment and works with air conditioner attachment.
- Adjustable, but maximum working pressure 100lbs. per sq. in.
- Size 54in. × 20in. × 40in. shipping weight 200lbs.
- Displacement 6 cu. ft. per minute.
- Preheats metal receivers to red heat.

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News in Brief

ROLLS-ROYCE LIMITED, are to build an aircraft engine repair and service factory near Sydney, Australia. It is expected to be in operation in the early part of 1954.

THE CRANES and conveyors at the new 10-acre Triumph Road factory of the Raleigh Industries, Limited, Nottingham, were supplied by Herbert Morris, Limited, Loughborough.

ABOUT 1,000 EMPLOYEES of Stewarts and Lloyds, Limited recently received long-service awards. It was stated last week that of a total of 15,500 employees, 2,500 have now served for more than 30 years.

LAST SUNDAY Mr. Frank Hudson and Mr. Peter Madden broadcast from Radio Luxembourg on the subject of Productivity in the Brassfoundry. The feature had been arranged at the request of the American Embassy.

TWENTY WORKMEN of a small engineering works at Annan gave their blood to help "the boss," Mr. Robert Boyd, after an emergency operation in Dumfries hospital, when the supply of the blood group that Mr. Boyd needed had given out.

BRITISH ELECTRONIC PRODUCTS (1948), LIMITED, one of the subsidiary companies of the Lancashire Dynamo Group, has now changed its name to Lancashire Dynamo Electronic Products, Limited. Manufacture and development will continue under the new title from the same address at Rugeley, Staffordshire.

EXPERIMENTS ARE BEING CARRIED OUT by Wm. Doxford & Sons, Limited, Sunderland, on the possibility of increasing the power of its two-stroke opposed piston engine. At present engines of this type up to 8,500 b.h.p. on a single shaft are built, but inquiries have been received as to whether engines up to 14,000 b.h.p. could be constructed.

FOLLOWING A STATEMENT at a meeting of the Bradford and Keighley District Committee of the East and West Ridings Regional Board for Industry at Bradford, last week, that short-time in the textile industry was now down to "negligible proportions," Mr. C. W. Llanwarne, Bradford Labour Exchange manager, said that there were signs of short-time working in the ironfoundry industry, because of a shortage of orders.

IN A COURT CASE at Otley last week, stated to be the first of its kind there, a fine of £1 was imposed on Edward Oates for carrying on business as a dealer in old metal from unregistered premises. It was pointed out by Mr. H. Halstead, clerk to the council, that the order under which these proceedings had been taken had been in force since the end of April. It was conceded that the offence might have been due to ignorance, and the case had been brought as a warning.

F. H. LLOYD AND COMPANY LIMITED, Darlaston, are experimenting with the practice of making firm's financial statistics comprehensible to employees in the factory and the current issue of "Steel Casting," the firm's house journal, contains a readily-understood statement of what happened to the money the company received for the castings made and sold. Cartoons and drawings illustrate salient points. Of every £1 earned, wages and benefits took 6s. 9d., materials 5s. 11d., taxes 2s., and dividends 5d.

RETURNING A VERDICT of "misadventure" at the inquest held at Keighley last week on John Ellis, a labourer, who was fatally injured at the Invincible Works, Keighley, of H. Widdop & Company, Limited, Diesel-engine builders, when a hook on a travelling crane gave way and allowed a sand-blasting cabinet to fall on him, the jury added a rider that "there should be, and should have been, more regular testing of all hooks and other equipment. Their lifting power and the weight of any article to be moved should be known."

THE VICTORIAN DIVISION of the Institute of Australian Foundrymen has elected its honorary secretary, Mr. George Thompson, as an honorary life fellow. Mr. Thompson has carried out the work of hon. secretary and treasurer for some years with most beneficial results to the Victorian division, and the sound technical and financial position of the division is a tribute to his devoted work. He is head of the department devoted to foundrywork and patternmaking at the Melbourne Technical College and is also a member of the Institute of British Foundrymen.

THE LAST of eight engines popularly known as the "big goods" class has been withdrawn from traffic by British Railways, and is to be broken up. Officially known as the 4-5-0 type Class 4 locomotive, No. 57954 (Highland Railway engine No. 79), was the fifth of eight locomotives built in 1918-19 by Hawthorn, Leslie & Company, Limited, Newcastle, to the design of Mr. Christopher Cummings, locomotive superintendent of the Highland Railway from 1915-1923. The engines were originally used for hauling heavy freight trains over the steep gradients in the Highlands.

YOUNG RECRUITS to ironfoundries are not entering the industry in sufficient numbers because they are being discouraged by their parents and teachers from taking jobs where they might get their hands dirty. Mr. A. B. Lloyd, of F. H. Lloyd & Company, Limited, James Bridge, Wednesbury, alleged last Monday night. They were being told, mistakenly in his view, he said, to get "white-collar jobs" instead. Mr. Lloyd, speaking during the presentation of certificates and prizes to apprentices of the firm in the works canteen, said the boy who was going to get on in the world was the one who was prepared to get down to a worthwhile job right from the start.

NEARLY 50 MEMBERS from all parts of the Midlands attended the inaugural meeting in Birmingham on November 12 of the Midlands branch of the Institute of Executive Engineers and Officers. Mr. G. H. Jones was elected chairman, Mr. W. D. Potter secretary and Mr. N. A. Dutton treasurer. Mr. E. Russell, national secretary of the Institute, presided and said that he hoped the inauguration of the Midlands branch would in time lead to the formation of further branches, with a regional council and representatives on the executive council. Headquarters of the Midlands branch, which covers all sections of the engineering industry, are at 241, Bristol Road, Birmingham.

AT AN INQUEST on November 12 the West Bromwich coroner, Mr. Lyon Clark, enquiring into the death of a moulder, expressed deep concern at the number of early deaths of moulders from pneumoconiosis. He told the jury that, having regard to the deaths of moulders between 40 and 50 years of age in the West Bromwich district, where there are a number of foundries, he regarded the whole field of enquiry as of grave importance to the industry, the medical profession, and all authorities concerned. He invited the jury to pass any comment which they thought might contribute to a reduction of this "scourge" and the jury, returning a verdict in accordance with the medical evidence on a 42-yr.-old moulder who had spent 20 years in the foundry trade, stated that they, too, were concerned at "the alarming increase in the number of deaths of these workers at an early age." There had been three similar deaths of iron moulders in West Bromwich in the past 12 months.

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SUPINEX "R" CORE BINDER

AN ENTIRELY NEW TYPE OF BINDER *is startling in its performance*—genuinely lowering *considerably* the per-ton cost of Core sand. Your first trials will also convince you of its labour-saving action—so easy to mix and bake, and further—its "KNOCK-OUT" PROPERTIES ARE PHENOMENAL.

FREE WORKING SAMPLES WILL BE GLADLY SUPPLIED ON REQUEST.

COLLAPSIBILITY IS AMAZING — GIVING "EGG-TIMER" SHAKE-OUT !

100% RECLAMATION OF SAND FROM KNOCKED-OUT CORE SAND

NO FUMES DURING CASTING

NO NEED TO MODIFY YOUR CORE SHOP FACILITIES

GREEN & DRY STRENGTH PROVIDED FOR—NOTHING TO ADD—ONLY WATER

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Raw Material Markets

Iron and Steel

Licences now being issued to the foundries for pig-iron supplies cover the three months of November, December, and January instead of the two-monthly period which has previously been in operation. The tonnages allocated are to provide sufficient for current consumption and a maximum working stock of three weeks, based on the stocks already available at the foundries. In view of the decreased demand, the allocations, in the main, appear adequate, but some users are pressing for increased tonnages.

The low- and medium-phosphorus pig-irons for the engineering foundries are none too plentiful. Outputs of hematite have improved, but there is still a shortage. Few foundries have sufficient stocks of any of these grades; present deliveries, however, appear to enable foundries to fulfil their commitments. A month or two ago foundries would accept all offers of pig-iron which they could utilize in their mixtures, irrespective of analysis or price, but they are now more discriminating. Although the volume of work available for some of the light and jobbing foundries has declined, many of them find it difficult to acquire all the high-phosphorus pig-iron they need. Outputs of this grade will continue on a reduced scale for a month or two until a furnace producing about 2,000 tons will be put into commission in the Derbyshire area. At about the same time two smaller ones are due to be blown in after re-lining and repairs.

While the foundry grades have not appreciably improved from the higher production of pig-iron now being obtained, the steelmakers continue to benefit by the larger supply of basic pig-iron, which is helping considerably to offset the decline in the supply of scrap. The proportion of scrap used in the manufacture of steel is decreasing, so that the demand for basic iron is unlikely to be relaxed. Fortunately, ample supplies of iron ore and a steady improvement in coke supplies are enabling producers to maintain maximum outputs from the furnaces now in blast.

The re-rollers continue to be fairly well employed and the sheetmakers are heavily engaged. Orders for small bars, sections, and strip are confined mainly to home users. More export business for small bars would be welcomed, but U.K. prices are too high to compete favourably with oversea producers. The sheet re-rollers' export position is rather different; they have plenty of orders for oversea buyers and could book more if outputs and quotas permitted.

Non-ferrous Metals

In the United States last week a fairly sharp advance was seen in the lead price, first by 20 points and then by a further 30 points, bringing the current quotation up to 14½ cents. This advance was made by the chief producer, but others, including the Custom smelters, followed. In London the quotation fluctuated from day to day, but the tone was mostly very steady and firm. Trading of both zinc and lead futures on the New York Commodity Exchange was active, and initially both metals showed a firm tendency, but zinc later declined slightly in sympathy perhaps with conditions on this side, where the outlook for the metal is not considered very bright. On the Continent it is reported that there are offers below £90, which may perhaps be taken as the measure of expectation regarding the prospect for the zinc market when it opens in London in the New Year.

The trade is still awaiting definite news from the Ministry of Materials that January 1 will be the date for changing over from bulk purchasing to free enterprise, and consumers comment that they are not being given much time to arrange their supplies with the producers. There is no risk, however, of anyone going short of zinc, for stocks in the country are more than ample.

Official prices for refined pig-lead were:—

November—Thursday, £97 15s. to £98; Friday, £97 10s. to £97 12s. 6d.; Monday, £96 to £96 5s.; Tuesday, £97 10s. to £97 15s.; Wednesday, £94 15s. to £95.

February—Thursday, £97 15s. to £98; Friday, £97 10s. to £97 12s. 6d.; Monday, £96 to £96 5s.; Tuesday, £97 10s. to £97 15s.; Wednesday, £94 15s. to £95.

Official tin quotations were as follow:—

Cash—Thursday, £951 10s. to £952 10s.; Friday, £955 to £956; Monday, £962 to £964; Tuesday, £966 10s. to £967; Wednesday, £964 to £966.

Three Months—Thursday, £936 to £937; Friday, £939 to £941; Monday, £943 to £945; Tuesday, £947 5s. to £947 15s.; Wednesday, £964 to £966.

Electric Annealing Adopted

With deposition on the town averaging some 30 tons a month per square mile, Willenhall Urban District Council, and the health officers naturally welcome any step by manufacturers that will reduce atmospheric pollution. Showing their appreciation of an expensive scheme begun by H. & J. Hill (Willenhall), Limited, malleable ironfounders, of Walsall Road, the chairman of the Council, Councillor J. A. Parkes, Councillor A. Webster, chairman of the Public Health Committee, Mr. J. R. Riding, Clerk of the Council, and Mr. H. E. T. Lowbridge, senior Sanitary Inspector, on Tuesday visited the works to see a new electric annealing oven recently installed.

The oven, costing over £20,000, is part of a scheme to replace nine coal-fired ovens and has a greater output than all the old ovens. It abolishes smoke and considerably reduces the amount of manual labour and fatigue.

Congratulating the company on a large scheme of extensions and improvements they had in hand, Councillor Parkes said, although the cost of the new oven was high, he understood that production had increased to such an extent and the material was so much better that it was well worth while. He hoped it would encourage other firms in the town to instal new plant for the sake of public health.

Correspondence

(*Continued from page 592*)

IRON AND STEEL BILL*

To the Editor of the FOUNDRY TRADE JOURNAL

SIR,—I feel that I can now share Mr. T. Lee's irritation and think he owes me an apology for misquoting my question.—Yours, etc.,

C. H. KAIN,
LAKE & ELLIOT, LIMITED.

November 18, 1952.

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* This further reply to the letter of Mr. T. Lee, printed on page 592 of this issue, arrived too late for inclusion on that page.—EDITOR.

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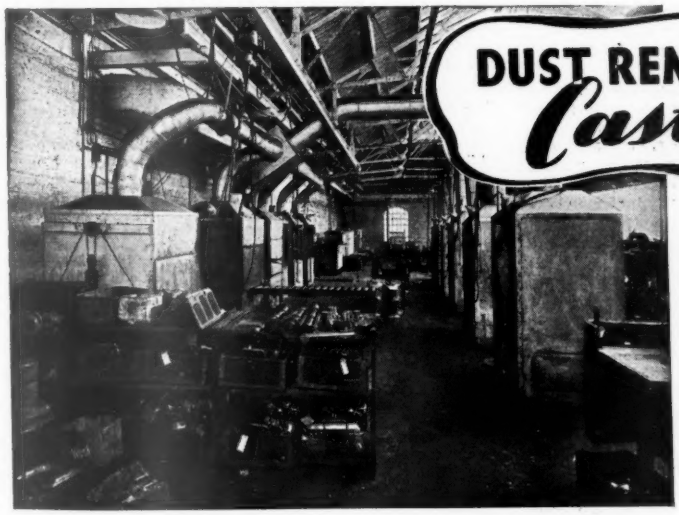

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Current Prices of Iron, Steel, and Non-ferrous Metals

(Delivered, unless otherwise stated)

November 19, 1952

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2:—Middlesbrough, £13 1s. 6d.; Birmingham, £12 15s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, £16 8s., delivered Birmingham. Staffordshire blast-furnace low-phosphorus foundry iron (0.10 to 0.50 per cent. P, up to 3 per cent. Si), d/d within 60 miles of Stafford, £15 5s. 9d.

Scotch Iron.—No. 3 foundry, £15 19s. 6d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, £17 14s. 6d. South Zone, £17 17s.

Refined Malleable.—P, 0.10 per cent. max.—North Zone, £18 14s. 6d.; South Zone, £18 17s.

Cold Blast.—South Staffs, £18 2s.

Hematite.—Si up to 2½ per cent., S. & P. over 0.03 to 0.05 per cent.:—N.-E. Coast and N.-W. Coast of England, £16 2s.; Scotland (Scotch iron), £16 8s. 6d.; Sheffield, £17 3s.; Birmingham, £17 9s. 6d.; Wales (Welsh iron), £16 8s. 6d.

Basic Pig-iron.—£13 19s. all districts.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered.)

Ferro-silicon (6-ton lots).—40/55 per cent., £57 10s., basis 45% Si, scale 21s. 6d. per unit; 70/84 per cent., £86, basis 75% Si, scale 23s. per unit.

Ferro-vanadium.—50/60 per cent., 22s. per lb. of V.

Ferro-molybdenum.—65/75 per cent., carbon-free, 10s. per lb. of Mo.

Ferro-titanium.—20/25 per cent., carbon-free, £204; ditto, copper-free, £212.

Ferro-tungsten.—80/85 per cent., 27s. 6d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 30s. 8d. per lb. of W.

Ferro-chrome (6-ton lots).—4/6 per cent. C, £85 4s., basis 60% Cr, scale 28s. 3d. per unit; 6/8 per cent. C, £80 17s., basis 60% Cr, scale 26s. 9d. per unit; max. 2 per cent. C, 2s. per lb. Cr; max. 1 per cent. C, 2s. 2½d. per lb. Cr; max. 0.15 per cent. C, 2s. 3½d. per lb. Cr; max. 0.10 per cent. C, 2s. 3¾d. per lb. Cr; max. 0.06 per cent. C, 2s. 4d. per lb. Cr.

Cobalt.—98/99 per cent., 20s. per lb.

Metallic Chromium.—98/99 per cent., 6s. 5d. to 6s. 9d. per lb.

Ferro-manganese (blast-furnace). — 78 per cent., £49 0s. 8d.

Metallic Manganese.—93/95 per cent., carbon-free, £262 per ton.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft, u.t., £25 4s. 6d.; tested, 0.08 to 0.25 per cent. C (100-ton lots), £25 14s. 6d.; hard (0.42 to 0.60 per cent. C), £27 12s.; silico-manganese, £33 8s.; free-cutting, £28 8s. 6d. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £31 9s.; case-hardening, £31 17s.; silico-manganese, £34 9s. 6d.

Billets, Blooms, and Slabs for Forging and Stamping.—Basic, soft, up to 0.25 per cent. C, £29 8s.; basic, hard, over 0.41 up to 0.60 per cent. C, £30 8s.; acid, up to 0.25 per cent. C, £31 17s.

Sheet and Tinplate Bars.—£25 3s. 6d.

FINISHED STEEL

Heavy Plates and Sections.—Ship plates (N.-E. Coast), £29 14s.; boiler plates (N.-E. Coast), £31 1s. 6d.; chequer plates (N.-E. Coast), £31 3s.; heavy joists, sections, and bars (angle basis), N.-E. Coast, £27 17s.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., untested, £31 15s. 6d.; flats, 5 in. wide and under, £31 15s. 6d.; hoop and strip, £32 10s. 6d.; black sheets, 17/20 g., £41 12s. 6d.; galvanized corrugated sheets, 24 g., £52 9s.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £50 18s. 3d.; nickel-chrome, £71 7s. 9d.; nickel-chrome-molybdenum, £79 2s. 6d.

Tinplates.—57s. 1½d. per basis box.

NON-FERROUS METALS

Copper.—Electrolytic, £285; high-grade fire-refined, £284 10s.; fire-refined of not less than 99.7 per cent., £284; ditto, 99.2 per cent., £283 10s.; black hot-rolled wire rods, £294 12s. 6d.

Tin.—Cash, £964 to £966; three months, £945 to £945 10s.; settlement, £964.

Zinc.—G.O.B. (foreign) (duty paid), £110; ditto (domestic), £110; "Prime Western," £110; electrolytic, £114; not less than 99.99 per cent., £116.

Lead.—Refined pig-lead: November, £94 15s. to £95; February, £94 15s. to £95.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £130 15s.; rolled zinc (boiler plates), all English destinations, £128 15s.; zinc oxide (Red Seal), d/d buyers' premises, £136.

Other Metals.—Aluminium, ingots, £166; magnesium, ingots, 2s. 10½d. per lb.; antimony, English, 99 per cent., £225; quicksilver, ex warehouse, £70 10s. to £71; nickel, £454.

Brass.—Solid-drawn tubes, 26½d. per lb.; rods, drawn, 37d.; sheets to 10 w.g., 31½d.; wire, 32½d.; rolled metal, 29⅝d.

Copper Tubes, etc.—Solid-drawn tubes, 32½d. per lb.; wire, 317s. 9d. per cwt. basis; 20 s.w.g., 346s. 3d. per cwt.

Gunmetal.—Ingots to BS. 1400—LG2—1 (85/5/5/5), £196 to £218; BS. 1400—LG3—1 (86/7/5/2), £215 to £238; BS. 1400—G1—1 (88/10/2), £365 to £375; Admiralty GM (88/10/2), virgin quality, £340 to £380 per ton, delivered.

Phosphor-bronze Ingots.—P.Bl, £355 to £385; L.P.Bl, £250 to £275 per ton.

Phosphor Bronze.—Strip, 44d. per lb.; sheets to 10 w.g., 46½d.; wire, 49⅝d.; rods, 44½d.; tubes, 42½d.; chill cast bars: solids 4s. 4d., cored 4s. 5d. (C. CLIFFORD & SON, LIMITED.)

Nickel Silver, etc.—Ingots for raising, 2s. 9½d. per lb. (7%) to 3s. 10½d. (30%); rolled metal, 3 in. to 9 in. wide × .056, 3s. 3½d. (7%) to 4s. 4½d. (30%); to 12 in. wide × .056, 3s. 3½d. to 4s. 4½d.; to 25 in. wide × .056, 3s 5½d. to 4s. 6½d. Spoon and fork metal, unsheared, 3s 0½d. to 4s. 1½d. Wire, 10g., in coils, 3s. 9½d. (10%) to 4s. 10½d. (30%). Special quality turning rod, 10%, 3s. 8¾d.; 15%, 4s. 2d.; 18%, 4s. 6½d. All prices are net.